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ABSTRACT

Official opening statements and papers on networking and the development of information technology which were presented at the 1982 International Federation of Library Associations (IFLA) conference include: (1) opening speeches by Else Granheim (IFLA president) and Kenneth H. Rogers (UNESCO Representative); (2) "The Importance of Networks Within the Present Context of the World of Information" by Celine R. Cartier (Canada); (3) "Worldwide Information Networks" by Marc Chauveinc (France); (4) "Library Networks: The Canadian Experience" by Basil Stuart-Stubbs (Canada); (5) "The Role of Libraries in the Information Network" by Gunther Pflug (Federal Republic of Germany); (6) "Chinese Library Networks: Retrospect and Prospect" by Xu Wenxu (People's Republic of China); (7) "Libraries of the Future: Electronic Networks and Human Concerns" by Edward Cornish (United States); (8) a response to Cartier's keynote address by F. W. Lancaster (United States), which discusses the future of electronic publishing and the general impact of technological developments on libraries and librarianship; (9) "The Library Network of the Soviet Union" by L. A. Gvishiani-Kosygina (USSR); and (10) "Networks: The Coexistence of Concept and Technology" by Escorcia S. German (Colombia). (ESR)

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INTERNATIONAL FEDERATION OF LIBRARY ASSOCIATIONS

General Conference, Montreal 1982

Official Opening Statements and Speeches

Plenary Session I and II

Papers

IR 050 186

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Mr. Ministers, honoured guests and friends of IFLA,
dear colleagues,

After IFLA could rightly begin to call itself a world-wide organization, many years passed before its General Conferences were held outside Europe. This happened for the first time 15 years ago and the arranger country was Canada. This fact bears witness that there was an active and outgoing library milieu in this country, then as there is now.

IFLA has in the meantime become more enterprising, some people may want to say, and jumps ambitiously from one continent to the next with its annual conferences. It is correct that, especially in later years, it has been possible for us to extend our field of activity to a considerable degree, and we have been able to show in action that we are a world-embracing organization and that we feel responsible for and interested in the development of the library systems in all parts of the world.

Insight into and understanding of other people's way of thinking and way of life are necessary to establish proper co-operation, and such insight and understanding are best acquired through seeing and experiencing through one's own eyes, at first hand. The importance of holding our General Conference and Council Meetings alternately on the different continents and in different countries, can thus not be emphasized too often. On behalf of IFLA I therefore beg to direct our warm thanks to ASTED (Association pour l'avancement des sciences et des techniques de la documentation) for the invitation to hold this year's conference in Montreal.

Since IFLA's members last met in Canada a new generation of librarians has emerged, a fact which is shown amongst other things in the many replacements in the honorary posts of the Sections within the organization at the last election. The number of members is still on the increase and new countries are being represented. And countries belonging to the Third World have joined to a great extent during the later years.

The distinctive feature of this year's conference as regards participating countries is the strong representation from Latin America. There may be several reasons for this. One of them is the pre-session seminar which has just been arranged thanks to financial support from IDRC (International Development Research Center), and which has made it possible for the participants also to attend the IFLA Conference. Partly, of course, the strong representation from Latin America is also due to the fact that Canada is somewhat closer than Europe and the Far East, but first of all I suppose the reason is to be found in the growing interest in international co-operation and in IFLA, to be concrete. There are many signs indicative of this, which we in IFLA's steering bodies appreciate as a great challenge.

The times we are living in right now call for realism and practicality, and in spite of the increasing participation from Spanish-speaking countries I cannot, unfortunately, promise the introduction of Spanish as a fifth official IFLA-language. It should still be considered a good step forward, I think, that an increasing number of our publications will now be at hand in Spanish, at the same time as Spanish this year will be and has been used at several seminars. With continued support from other organizations we hope that this is only a beginning.

The economic setback which the world is now experiencing, will in most places also affect the libraries. A good many people will perhaps, quite spontaneously, say that

the libraries must of course carry their share of the burden. We ought not to forget, however, that in times of economic crisis it is particularly important that human beings have access to as much as possible of existing information, as it is through education and knowledge that we are enabled to face depression and find effective remedial measures. And it is the task of our profession to convince politicians that cuts in the libraries' budgets will necessarily lead us into a vicious circle. Information is in itself a resource and plays an important role in social, economic and educational develcpment as well as in scientific and technological research.

At the same time we have to make clear that we are prepared to make the most of the funds at our disposal. "Networks" is here a cue, and I am now not thinking of this word in the sense most natural to most people living in Montreal, that is the impressive network of underground passageways. What I am thinking of has also to do with communication, that is library and other information networks in the sense that we are going to deal with it as the theme for this Conference.

Another concept of current interest is UAP, in which programme networks come in as important elements. Never has the flow of information been greater, and the task of making this flow accessible to as many people as possible, regardless of where they live, is a challenge facing us together with others working in the field of publication and distribution of information.

The UAP Congress arranged by Unesco in May this year, in co-operation with IFLA, I think it is correct to characterize as very successful. Now it is important to strike while the iron is hot and try to carry out into effect as many as possible of the recommendations approved. As I direct our thanks to Unesco for good co-operation and financial support, I take the strong representation from Unesco at this conference as an indication of active

co-operation to reach our common goals also in the future.

IFLA has many good supporters and active members whom I should like to thank for their efforts since we met last time, but this would take too long. Since we are in Canada I feel sure it will be accepted that I now single out for special mention some supporters in this country, as examples. It is a pleasure to mention in this connection the National Library of Canada which under the leadership of Dr. Guy Sylvestre is an outstanding example in supporting our main international programmes. The Canadian Library Association in the same way makes a great contribution to publicity and sale of our UBC publications.

Finally I want to thank CIDA (The Canadian International Development Agency) for its financial support to IFLA's grassroots' projects, projects of great importance to library users and potential users in the Third World. I hope these projects may serve as good examples also for other supporting organizations.

The local arrangers here in Montreal have done an extraordinarily thorough piece of preparatory work in order that this conference may be successful. Now it is up to every one of us to do the rest, through active participation.

With these words I have the pleasure of declaring IFLA's 48th General Conference as opened.

IFLA GENERAL CONFERENCE, MONTREAL 1982

Division:

Section:

OFFICIAL OPENING

150/PLE/11-E
86

SPEECH OF THE UNESCO REPRESENTATIVE AT THE OFFICIAL OPENING OF THE CONFERENCE

Kenneth H. ROGERS

Meeting
86

Montreal, 22 to 28 August 1982

Speech of the Unesco Representative at the Opening Session

(Kenneth H. ROBERTS

Madame President
Your Excellencies
Ladies and Gentlemen

It is my privilege to bring you the greetings of the Director General of Unesco who sends warm wishes to the Federation for the success of this 48th IFLA Conference.

The choice of "Networks" as this year's theme seems particularly appropriate for an IFLA Conference for it helps set the stage for a concerted effort here by professional groups from all over the world to advance common causes and work towards meaningful objectives. The rationalization and shaping of human and material resources through development of formal and informal neworks seems indeed to provide the only answer to the complex problems of providing for today's information needs in all societies.

We shall also draw stimulation from our presence in Canada where library and information services designed to serve very diversified groups of users have a long history and where a capacity for adaptation to new challenges and new opportunities continues to characterize the information scene.

Towards the end of 1982 a special session of Unesco's General Conference is to consider a Draft Medium Term Plan for the period 1984-1989. Following a lengthy period of consultation with Member States and professional organizations and reflection within the Secretariat about the role Unesco should play during this period it has been decided that the principal efforts of the Organization should be directed to the following tasks :

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1 . To contribute to a continuous study of present world problems so as to create a greater awareness of the common destiny which now unites individuals and peoples alike;

2. to help to pave the way for the widest participation by individuals and groups in the life of the societies to which they belong and in that of the world community ;

3. to assist in strengthening problem - solving capability by fostering the development and democratization of education and the advancement of science, by increasing and developing the creative potential of all peoples, by developing research and training infrastructures and by promoting the free flow of knowledge and know-how ;

4. to help to facilitate the changes and transitions that are now recognized as necessary by the international community as a whole, in fields where the convergence of aspirations gives rise to a broad consensus, notably the development process and management of the environment.

5. to arouse and encourage a renewal of values within a context of genuine understanding among peoples.

These five essential tasks have shaped the lines of emphasis of the thirteen major programmes into which Unesco's efforts will be divided during this six year period.

The profession will perhaps take pride in the fact that its mission has been considered of sufficient importance to be assigned one of these 13 major programmes, that entitled "Information Systems and Access to Knowledge". This programme will be concerned with the problems of the flow and utilization of information, the obstacles to be overcome and the conditions to be created so that it may be accessible and profitable to the user, whoever he may be and wherever he lives and engages in his activity, by means that include data banks and networks and of course libraries of all kinds as well as archives.

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This major programme is based on an analysis of current problems which emphasizes the importance of information as a key to development. In the world about us the present frequent lack of information and of efficient means for its transfer are factors which interfere with the rational use of natural and human resources, with scientific and technological development, with agricultural and industrial progress as well as with the advancement of culture and social well-being.

With the continuous advancement of knowledge all societies anxious to make progress are faced with the need to operate systems for the storing, processing and dissemination of information. Such systems and services are at present being developed mainly in the industrialized countries. But developing countries need access to what is relevant in these outside data sources and must develop in parallel at national or regional levels their own data bases and data banks. A rational organization of local information would permit in addition an active participation in international information exchanges.

The proliferation of projects and proposals for establishing international, regional and sub-regional information systems and networks, all based on the use of new information technologies, threatens to create unbridgeable divisions and anarchic situations.

Many countries now have to overcome a variety of technical obstacles and financial constraints in order to gain access to information. The compelling requirement is for freer and more effective access to relevant information. Information should be able to flow freely. It is therefore imperative on the one hand, to ensure the compatibility and interconnection of information systems throughout the world and, on the other, to foster the development, in all countries and at the regional level, of infrastructures, networks and data bases which will make it possible to handle all the information needed for scientific, technological, economic, social or cultural activities.

Time does not permit examining all the obstacles faced by the developing countries in attempting to overcome the gaps in information provision between them and the industrialized nations. Current obstacles faced by many of them in obtaining access to information

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include inadequate bibliographic control, lack of financial resources for access to foreign data bases, lack of sufficient trained personnel, language barriers and the scarcity of referral services to identify and direct users to appropriate sources.

Obstacles to the availability of publications may include lack of finding aids like union catalogues ; lack of funds for document purchase ; lack of effective acquisition policies ; lack of document repositories and lack of effective policies on document delivery.

Obstacles to the absorption and effective use of information may include the low educational level of many users ; language barriers and lack of translation facilities ; lack of motivation to use information ; lack of user training at school and professional levels and certainly sometimes the ineffective performance of information services.

The major programme which is to contribute to the solution of these problems will be divided in three programmes. The first to be concerned with "Modern technologies, standardization and interconnection of information systems" will concern itself with the development of tools for information processing and transfer, the application of modern technologies and standardization tools to the creation and exploitation of data bases and co-operation in the field of information with organs of the United Nations System.
The second programme "Infrastructures, policies and training necessary for the processing and dissemination of specialized information" is intended to encourage the establishment or reinforcement in Member States of a full range of library, archives and documentation centres, information analysis centres, referral centres, data bases and data banks and concurrently the education and training programmes required to prepare specialists to operate them effectively and to prepare users to satisfy their information needs.

The third programme, "Information and documentation systems and services of Unesco" is to be devoted to the harmonized collection, organization and dissemination to Member States of information in the fields of activity of Unesco by the documentation, library and archives services of the Organization and the specialized information systems developed in connection with its various sectoral programmes.

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It seems clear that during the 1984 to 1989 period there will continue to be a marked convergence between the programmes of IFLA and of Unesco. Actions which will be taken by the two organizations will not be identical, but complementary as each organization brings to closely related tasks its own experience, its knowledge and its special skills.

In the immediate future we are to be collaborating closely at the important October regional meeting in Caracas on development of public libraries in Latin America. My Unesco colleagues who are attending this Conference and myself will be reviewing with many of you here in Montreal progress made in our co-operation on activities in such diversified areas as UBC, and training problems.

Our thoughts still turn often to the recent International Congress on Universal Availability of Publications organized in collaboration with IFLA and held in Paris last May. We will be particularly interested to learn of IFLA's plans for follow-up to the Congress and to start during this Conference the process of identifying areas where Unesco can carry this work forward. You will certainly have noted the important place which seems likely to be given by Unesco during the next Medium-Term Plan period to problems of improving access to publications.

I am sure that this Conference will be an enriching experience for all of us. Let me finish by wishing you much success as this 48th General Conference begins.

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réseaux
48e conférence générale de l'IFLA – Montréal
22-28 août 1982
Fédération internationale des associations
de bibliothécaires et des bibliothèques

networks
48th IFLA General Conference – Montréal
August 22-28, 1982
International Federation of Library
Associations and Institutions

1982

IFLA 48e conférence générale: Les réseaux

Fédération internationale des associations
de bibliothécaires et des bibliothèques

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The Importance of Networks Within the Present Context of the World of Information

by

Céline R. CARTIER
Directeur des bibliothèques
Université Laval
Québec, CANADA

Meeting
88-51

Those who are familiar with the arts of Québec, in particular with the works of her painters and writers, will have noted phenomena which are no doubt common to all Nordic countries: the desolateness of open spaces and trackless forests as well as the isolation created by cold winters and large frozen lakes swept by drifting snow. This is the environment described by Louis Hémon in Maria Chapdeleine, that world-famous novel written at the beginning of the 20th century; this same isolation is reflected today in the paintings of the artist Jean-Paul Lemieux. How many countries or even regions within large countries on this enormous planet have already experienced or are still experiencing a form of isolation which, unlike the one described by Québec's artists, is perhaps not climatic but rather linguistic, geographical, cultural or economic?

This year, when the International Federation of Library Associations and Institutions chose networks and their importance in the present context as the theme of its 48th conference, it wanted to emphasize the need to eliminate all forms of isolation in any country whatsoever, since mankind now has at its disposal the technical means enabling it to not only bring people closer together more easily but to also make communication instantaneous. From now on, it will be possible

to establish new links between the Old World - Africa, Europe and Asia - and the New World - America and Oceania - without the dangers and risks of the means of transportation of previous centuries or even the disadvantages of the first means of communication of this century. It cannot be denied that many problems still exist, be it only the difference in the willingness shown by different countries to attain this open communication objective or even the limited investment capability of a good many societies at the present time. Moreover, even though it will be possible to speak of worldwide technology from now on, the ideal of instantaneous communication on a comparable scale will never be attained as such. It will be much more a question of pooling the various data communications resources which countries will have acquired by combining local, regional and national achievements.

We must not lose sight of the fact that the attainment of this objective, even in its most limited terms, that is locally, presupposes that, first of all, strictly technical infrastructures consisting of facilities and means of communication be set up and that groups be created which will be able to work together and communicate with one another by using these infrastructures. Before opening the discussions which will

take place throughout the entire conference, it is important to make a clear distinction between the two aspects of the notion "network", namely the human and technical aspects, which are not always specified in the numerous books and articles published on the subject. In other words, networks can involve the collaboration of machines or people; facilities might be linked to one another or contacts established between individuals or groups of individuals. Because of our common concerns within the IFLA, I believe that it is especially the human aspect of the notion "network" which attracts our attention; this aspect is based on principles of collaboration, resource sharing and collective planning, regardless of whether the objective is to organize library, collections or information networks. The technical aspect, which is based on an advanced technology involving telecommunications and computers, cannot be neglected, however. In any case, as has often been repeated, less and less of a distinction is made between cause and effect, between computers or computer networks or the achievements they make possible. "There is no difference between the world of communications networks and that of computers".

It is not inadvertently that comparisons have often been made between the organization of countries, societies or cities and that of the human body; we readily use the term

backbone in reference to the mainstay of various economic and industrial sectors, compare the roads system with the arteries of the blood system and describe green spaces as the lungs of urban centres. These comparisons bear witness to a vague desire to attain an unequalled degree of perfection: that of the human body. This tendency is reflected by the analogy drawn by the authors of a book on teleprocessing between telecommunications and the nervous system. And what about the parallels frequently drawn between the human brain and the computer, originally called, at least in french, the "electronic brain"? As we know, the computer will never be more than the former's slave; however, it will liberate mankind, since it already helps to multiply by five, ten or even a hundred times the capacity of the human brain to store and process information rapidly. The brain is "the most complex object in the universe" and it was claimed in the fifties that "a computer which was sophisticated enough to perform the operations carried out by the 10 billion cells of a single brain would occupy an area larger than the entire earth". Proportions have changed considerably with miniaturization, and Christopher Evans ventured the following hypothesis in comparing the size of computers powerful enough to have as many functional units as the human brain. In 1960 these machines were the size of the Paris Opera; in the early seventies they were comparable to buses; by the middle of the decade they were merely the

size of television sets, and in 1978 they were no larger than typewriters. With the advent of the micro-processor in the 1980s, it is possible to imagine that the "electronic brain" will be smaller than the human brain. Even though these comparisons might be questioned, they serve to illustrate the advances made by each generation of computers.

Be that as it may, this sophisticated electronic brain will always be at a disadvantage in comparison with the human brain: its operational scope does not include the basically human capacity to create in a dynamic and coherent fashion. "Emotion and intelligence, freedom and discipline, reason and intuition, precision and imprecision, primary and secondary processes as well as chaos and order are all apparently contradictory data which coexist within the creative harmony of the human brain". Over the centuries, this creative capacity has given us the Egyptian papyrus, the parchment of Asia Minor, the poems of the troubadours and trouvères, Bernini's colonnade, Bach's concertos, the chapel in Ronchamp, penicillin, the cork, dynamite and Rubic's cube. It is strange and at the same time extraordinary that this handicapped brain which forms the computer will enable the human brain to increase this always imperfect creativity tenfold. Not only will it free the human brain from performing many of the operations required of it in the past, but from now on, it will enable man to greatly exploit a

capacity which he is the only living creature to possess: the faculty of imagination. The electronic brain will free the creative imagination by relieving the human brain of the weary task of storing unlimited amounts of information and of compiling and combining an infinite mass of figures and data which are as endless as the cosmos and its multitude of galaxies appear to us today. The computer will encourage human beings to maximize their creative potential; it will unleash the creative imagination.

Are the space ventures of today not first and foremost an exploration of this creative imagination rather than examples of scientific discoveries or man's ability to control scientific theories? And are they not made possible by the almost instantaneous information which computers, organized in networks, are capable of providing to scientists?

Is this not also the case with modern-day medical research? The creative imagination builds up hypotheses and, in an increasing variety of specialized fields, computers come to the rescue by conducting experiments, analysing the results, drawing conclusions or deciding which direction future research should take. The information network in such a vital field as medicine is constantly developing and certainly becoming the best guarantee of more rapid research and even discoveries. Not only will

computers be of assistance to the human brain, but they will also contribute to the brain revolution itself. Grey Walter has recommended using computers for conducting research on the brain and criticized the ridiculous characteristics which science fiction has attached to computers by usually presenting them as mischievous superhuman idiots. He stated that, like a child who has been frightened by a puppy which he has overly teased and who says that he has met with a bear, we are too inclined to project our anxieties, our feelings of guilt and inferiority, and our fears of not being equal to the task onto these obedient laboratory slaves. In fact, computers are domestic creatures who, just like horses and dogs, are allies of man.

As far as the repercussions of the technological revolution are concerned, it should be borne in mind above all that it is already certain that teleprocessing, a combination of data processing and telecommunications, will help to speed up the evolution of mankind. Already equipped with brains more sophisticated than computers, human being of ancient times definitely evolved in isolation, accumulating thousands of pieces of information daily, but forever repeating the same steps and thereby slowing down the progress which only the pooling of knowledge can allow. When individuals started

banding together into organized societies, which were the first networks of collaboration and sharing, a momentous stage in the history of mankind had been reached and, as a result, it was possible to speed up the evolution of man's capacities. Society might be considered a collection of individuals whose brains, interconnected through activities and common needs, exchange information, conclusions deduced through analysis and theories arrived at through research and creativity; in this context, is society not a network of an infinite number of memories and data-processing centres which also has access to a series of similar data banks ranging from the engraved stones of remote antiquity to Egyptian obelisks, the sculpted bibles on the cathedrals of the catholicity, Gutenberg's printed paper, modern-day video and the data banks of today's computers? By processing information, we enable individuals to evolve rapidly; the networks formed by societies accelerate this evolution even more.

Similarly, this IFLA conference constitutes a unique opportunity for human computers to meet in an effort to exchange information, process it collectively and analyse it to the point where new hypotheses may be deduced, research goals redefined and improved systems discovered. The discussions which will take place continually over the next few days, because of this incredible consortium of brains, will

in fact be aimed at examining the notion "network" within the context of the world of information.

In preparing this opening speech, my personal thoughts were directed more toward the world of information and its development as well as toward the present and future context within which networks will evolve. The notion "network" properly speaking will certainly be examined in detail in the papers of several of the specialists whose names appear on the conference program.

Some twenty years ago, when a certain number of texts began to appear concerning a new science christened computer science, authors hesitated somewhat about the vocabulary which should be used. In French at least, numerous questions were asked about the nouns to be chosen for describing the equipment, products and effects of the new technology; should the term automation or automisation or even informatisation be used? Would there be centres de calcul, centres de traitement or centres d'informatique? The question was even raised as to the sex of the basic piece of equipment of this highly promising science! Would it be termed ordinateur or ordinatrice? For a long time, one of Québec's major universities, no doubt more feminist than others, continued speaking of its computers in the feminine!

Since that time, morphology has ceased to be a preoccupation. No more time is spent hemming and hawing over points of grammar; developments have been too rapid and there has been, as it were, a veritable explosion of vocabulary resulting in a tremendous number of new terms, sometimes correct and sometimes incorrect, and undoubtedly far too numerous for even a librarian or reference librarian to remember or assimilate. The expressions data communications, teleprocessing, compunication, connector industry, optoelectronics, videodisc, videotex, courseware, mini-computer industry, nanoprocessors, etc., have been added to the glossary of automation terms.

Among these new terms, which some people might describe as somewhat mysterious and incomprehensible jargon, appeared, in the french literature, a meaningful, figurative, realistic and univocal expression: le "pétrole gris" which means "grey oil!" A new resource had been identified! This revolutionary technology, which has given birth to computers, is developing at a rate which some consider extremely rapid, remarkable and even alarming because of its still unforeseeable economic, political, social and cultural repercussions on future societies; it constitutes a tremendous resource which is believed to be inexhaustible and known to be still in the process of development, but its vast number of effects cannot be determined with absolute certainty. Wealth is definitely

accompanied by power, and power almost as surely accompanied by domination. What will the effects of this form of power be? Its foundations are unquestionably more solid than those of a warlike power whose supremacy might be only temporary or on the decline, or than those of petroleum which might become increasingly scarce, or even than those of an industry liable to become obsolete. I would be annoyed with myself for contemplating mysterious and threatening visions of the future, but it is useful to reflect somewhat on phenomena which in certain respects transcend ordinary human experience. Global speculations, or those opinions based on probabilities or outward indications, are relatively easy to make; all specialists and even nonspecialists accept the fact that data communications will revolutionize all sectors of economic life: the financial sector, administration, industrial applications, and research and production activities. It will completely transform business management, the world of education, health services, the administration of justice and even family life. But apart from entertaining certain intuitive ideas about the future, it is difficult and even presumptuous to attempt to make accurate predictions, since these are affected by political choices and investment capabilities as well as by an unforeseeable number of external variables. Intuitive feelings are not established

certainties. Remember the remark which Anokhin made to fellow brain specialists to the effect that the accumulation of facts can create a dangerous illusion of progress. On the other hand, as Marilyn Ferguson stressed in The Brain Revolution, "... so many improbable theories have proved to be genuine insights that one noted scientist said of a colleague's purported conclusion, 'It isn't crazy enough to be true.' " We cannot remain indifferent to this succession of good and bad prophets, but they should also make us wary of being unpleasantly surprised in the future.

If this technology, this "oil" or "grey gold" associated with economic power, were applied in social areas, it could provide tremendous services. Already, however, there is a great deal of concern, and the risks and benefits of numbering, coding and placing citizens on file in data banks are being weighed. The human brain would be like an open book.

However, the government needs information on all citizens in order to make decisions in many areas: housing, the food sector, resource allocation and social programs; on the other hand, it is an accepted fact that the individual's private life should be protected. How can it be ensured that individual liberties will be maintained? Will we have exclusive rights

to our thoughts and feelings, or will they be available to any organization which, because of expertise and technology, is able to obtain whatever information it wants about us? My attention was caught by an advertisement in Life magazine which mentioned this problem; it read: "The future is coming. And with it will come great benefits for mankind. And a whole new set of problems; in the future, electronic information gathering and analysis techniques could be used to find out more about you, and what you think and feel...How will we prevent our heads from turning into open books...in the age of information, with its omnidirectional microphones, its lasers, its incredible data banks?" The American Privacy Protection Study Commission was not very successful in its attemps to study ethical questions related to the handling of citizens' files stored in eventually interconnected data banks. There would be no barriers between a student's school record, a citizen's medical record or a salaried worker's financial statement; any information from the colour of a person's eyes to his professional status, income tax return, bank account or the amount and kind of medication he has consumed would be found in the files of these banks; in fact it could be added to them, removed from them and interpreted without the "owner" having the least suspicion of this invasion of his privacy. In this Kafkaesque perspective, citizens would be completely vulnerable, with absolutely no means of combatting this situation!

One of the most remarkable features of the social revolution perceptible in the combination of data processing and telecommunications and one which could be taken advantage of by the most varied networks of users is undoubtedly the enormous range of possibilities opened up by the liberation of two elements which have always posed obstacles to the progress of civilization: space and time. Territorial boundaries and the constraints imposed by distance and the time needed to obtain and disseminate information are suddenly removed. Without completely subscribing to the somewhat optimistic and casual opinion expressed by Jean-Jacques Servan-Shreiber in Le Défi Américain to the effect that man will be able to use the large amount of information which exists in the world today and is theoretically at his disposal just as flexibly, directly and simply as during a conversation with a neighbour, it can readily be admitted that information will be available almost instantaneously. However, this kind of communication is not, and probably never will be, as flexible, direct and simple as a conversation with a neighbour, be it only because it is not a question of one brain communicating with another and because human beings must first make an effort to learn, understand and assimilate these new techniques. The experiments conducted by the OCLC in 1981 are revealing in this regard. Access modes will of course be simplified, communication links between networks made more flexible and reliable, and languages standardized and made more

direct; however, it would be illusory to think that there would no longer be any constraints for both men and machines. At the present time, is the fact that a book exists a sufficient guarantee that an individual who is able to automatically decipher the language will read it? How much will it cost to have direct access to information? It is readily stated that costs will radically decrease over a very short period of time. This is probably true, but everything is always so relative. In 1982 water itself seems to be inexpensive and yet, even in North America, there are still some cities which do not have "direct access" to drinking water! There is certainly a great danger that the right to information, which is the most basic right of all citizens, will become proportional to individual wealth. Up until the advent of automated documentary banks, librairies were certainly one area in which citizens' rights to information were most equitably exercised. Even though the practice has sometimes been called into question, in living memory, the information stored in all kinds of libraries has always been free as long as it was transmitted by human beings. Once information began to be supplied by machines, libraires almost automatically charged fees. As Basil Stuart-Stubbs wrote in the Canadian Review of Information Science, it is perhaps time that libraries and the institutions in charge of them reconsider

the long-term implications of charging for services, before they become the appendages of commercialized information systems over which they have no control.

Government intervention is of course necessary in the public sector of information dissemination. The government should also take charge of certain social, cultural and educational programs. Many such achievements could already be mentioned. One example is the Mediatex project which was recently approved by the Canadian government and which will be carried out in Québec near the end of 1982. This project, which is subsidized by the government and will use Telidon technology, will be the joint undertaking of a consortium, the Université du Québec and a multinational corporation. One aspect of the program will be applied to adult education; adults will be able to take courses offered by Télé-université at home using interactive information systems. Citizens and the directors of small and medium-sized businesses will have access to a network of data banks; the government has requested that, initially, these services be offered in those areas where information is more difficult to obtain. Mediatex is one of the 52 projects which have been approved and subsidized by the Canadian government to promote and test Telidon technology

in the areas of agriculture and fisheries, business (real-estate listings, inventory control, publicity schemes, creation of software), health and education (professional guidance, consultation and diagnosis, provision of news to the handicapped using data communications systems), tourism and recreation (lists of parks, tourist areas, accommodations, etc.).

It is impossible to determine what the technological applications will be; futurologists' predictions even seem inordinately spectacular in this area. Most of the time, man and society seem to be the first to benefit from these applications. What exactly will they involve? Will there be more social justice? In this sphere especially, technology is a tool which may or may not be used to the benefit of citizens, and it depends entirely on governments which course will be followed. The architect Ulrich Franzen dispassionately stated that, although technology is a useful tool, he is convinced that the problem is basically a human one. It is perfectly obvious that no new technology is needed to house people properly; all that is required is the desire to do so. Nor is any new technology needed to chose between 10 more kilometres of freeway and a larger budget for a national library, or between an exhorbitantly expensive and revolutionary Olympic stadium and projects for urban renewal in a large North American city!

Would it be possible, for political choices to change so radically that the evolution of social justice keeps pace with that of humanity?, as seen by Teilhard de Chardin:

"the fullness of time, the gateway to the future and access to a world surpassing ordinary human experience are not reserved for only a privileged few or a chosen people among mankind; progress in this direction can only be made through the combined effort of all human beings".

The industrial society which replaced the agricultural society is gradually changing into one based on data processing or more simply on information; countries which have not already accepted this fact and which are not thinking of redirecting their research, planning and resource exploitation are in great danger of experiencing economic decline, being controlled by foreign networks or falling prey to even greater power struggles than the ones which are already beginning to surface between technological rivals. Last January, for example, the mass media described the "bitter struggle" which Antiope and Telidon were waging to gain potential markets. The stakes are already considerable, but they are only a pale reflection of the ones which will be involved in the revolution of the next two decades.

We will have entered the 21st century within 20 years. I will refrain from repeating the predictions which can be found ad nauseam in all kinds of magazines describing society in the year 2000; in fact, in more recent issues, these descriptions apply to the year 2010 or 2020, undoubtedly because the year 2000 is approaching too rapidly and too many people will still be alive - perhaps tanning themselves on the beaches of Florida or the Côte d'Azur and wishing they had those promised microprocessors beneath their umbrellas to keep an eye on their pension fund - to denounce the predictions which have not come true... People of the next century will be "plugged" so to speak into extremely sophisticated information and service networks; they will live in a society freed of all paperwork, will carry micro-computers in their pockets and will have mastered technology in their work, leisure and family life. I will leave it to others who are more competent and skilled at making conjectures to stretch their imagination to the limits of science-fiction and science-reality, on the one hand, because I believe that some of the repercussions of future changes are absolutely unforeseeable and will undoubtedly surpass the predictions of the 1980s and, on the other, because they are probably very different from the crude applications attempted at the present time. So many predictions have proven to be incorrect! Was the radio not supposed to replace newspapers? Was it not predicted that movies would

disappear when television invaded the home? Was it not promised in the 1960s that within twenty years man's diet would consist of synthetic food and pills? And what about the civilization of leisure which, over the past fifteen years, was forecast to the extent that recreology courses were set up? So far no one has benefited from these courses, since working hours are still just as long and retirement as late as ever! As for the predictions about libraries, they are so contradictory; some people imagined that by approximately the year 2000 these institutions would be completely transformed, emptied of their collections and staff, while others saw them remaining practically unchanged, with a few more terminals and fewer card catalogue cabinets. Professor Neill of Western University in Ontario spoke of the library of the future in the following terms: "Computerized information, interactive TV, and other innovations of the computer revolution may shape the library of the future,... but books will probably dominate the computer terminals... Given the tradition of the profession, only a catastrophe could cause a sudden and radical alteration in the way libraries develop." There must be room for reality between these extreme points of view. In any case, one thing is certain; the claim that this new civilization of osmosis between man and his terminal will lead mankind to the height of planetary harmony is, if not a sophism, at least a paralogism.

Is is even more certain, moreover, that this technological revolution will have to be accompanied by a profound transformation of educational programs. Rather than training generations of executants, courses will have to be aimed at training thinkers to program machines. From the moment they came into existence computers prompted fears because they were supposed to replace workers and reduce manpower needs. Such fears persist even today and the level of unemployment in the world is still often attributed to the computerization of factories, businesses and the entire economic sector. Once again these were rash predictions, for it seems that on the contrary computerized society will need more manpower than ever, not only in disciplines related to data-processing techniques but also in every other discipline. As André Danzin forecasts in Science et Renaissance de l'Europe, the data-processing and electronics industries will form the major sector of growth, but computer technologies, which are powerful factors of change in human societies, will have an even stronger impact on the creation of jobs in other activities. They will have equally important repercussions on agriculture, which will develop more rational means of exploitation, industry, whose production capacity will increase, and the service sector, which will develop and expand more rapidly. Danzin adds that it can legitimately be said that unless the force of circumstances is radically altered by a major crisis, an economy will emerge in which most of the

activities and jobs are related to information. This is a basic observation. For collecting, processing and disseminating information uses little energy and raw materials, but requires the availability of a large number of trained individuals.

This bold prediction of a future dominated by technology, of a scientific revolution centred on information and creating new jobs from inalterable raw materials, changed the course of Japan's economic development and made her the most important technological power in the world. Without natural resources or military strength, Japan staked her future on the only inexhaustible and unlimited resource she had at her disposal and which is, moreover, at the disposal of every other country: the inventive capacity of the brain. It can be noted that the prospects which the Japanese envisaged in planning to make use of such new raw materials as information, communication and ideas have proven to be entirely correct. The robotization of industry has not condemned workers to unemployment. By studying the present situation in Japan, whose technology is in the process of invading all sectors of industrial production, it can be seen that the deseasonalized level of unemployment was only 2.3% at the beginning of 1982, while it was 8.3% in a country like Canada. While perfecting their technology, however, the Japanese had to reorient the staff removed from factories toward "intelligent jobs" and provide for their training and upgrading.

Unless major changes are made in the educational system, societies will have too many people and at the same time not enough to maintain an essential balance between supply and demand, both of which will remain substantial but disproportionate to one another: there will be an alarming number of workers trained to meet the requirements of sectors which are on the decline with the result that many will be unemployed; at the same time, there will be an equally alarming demand in rapidly developing fields, but it will be impossible to meet this demand because of a lack of adequately trained manpower. The same phenomenon could arise in the specific field of information science. In a joint work on telecommunications and libraries, which appeared in 1981, Lancaster reported that it is possible to foresee the gradual disappearance of libraries as they have traditionally been designed, and he mentioned the changes which the services of these institutions will undergo. On the other hand, he stressed the importance of the role which librarians are required to play in the electronic era: "Rapid growth of information resources in electronic form may greatly reduce the value of the library but it may greatly increase the value of the librarian" provided, however, that they are adequately trained to carry out new tasks. As Kochen emphasized, the information specialist of the future will have a highly complex

job to perform: "It will be an occupation of great responsibility requiring correspondingly high standards of admission to and training for the profession." In my opinion, the library profession has always been and will become even more fascinating if training schools agree once again to radically alter their curricula. These curricula have evolved considerably over the past ten years, but instead of anticipating new developments, they have mainly adapted themselves by fits and starts to changes already taking place in libraries. Training schools should not follow in the wake of change but should foresee it and be a step ahead of it as it were. Whether librarians become vocational advisors, mediators, freelance consultants, information brokers or members of small specialized consortia, or whether they become members of research teams in pure, applied, human or social sciences or administrators of electronic information in firms specializing in either goods or services, they are faced with marvelous prospects! They will develop their skills in a privileged profession, and I am convinced that the necessary changes will take place in an atmosphere which is psychologically reassuring if not to say serene. On studying the record of technological achievements in libraries and the changes which have taken place in librarians' daily work, an irrefutable observation must be made: a long course has been followed, involving numerous pitfalls and much resistance, but it has led to the most tremendous transformation of libraries since

antiquity. People are more or less aware of these changes, but they exist and, above all, we know that they will become even more marked before the end of the 20th century. Libraries have already undergone their first revolution. In order to become convinced of the validity of this statement, one need only take a retired librarian from the 1960s to any of the present-day university libraries; the latter will not hide his amazement and will admit that he is completely lost amidst the rows of cathode screens, used in both technical and public services, COM catalogues, compact shelving and automated lending and electronic anti-theft systems. He will admire the multitude of by-products which are presently available and which were inconceivable only just twenty years ago. The list of automated library networks presently in existence in the United States alone, as drawn up by Susan Martin in her book Library Networks 1981-1982, mentions thousands of institutions which currently have partially or completely automated systems at their disposal; therefore, thousands of librarians in the United States and elsewhere throughout the world have had to aquire expertise, new knowledge and remarkable skills in order to design, plan, set up and develop revolutionary systems based on nascent technologies for processing, storing, disseminating and using documentary information. The behaviour of librarians has also changed. The information science schools of the future, whose image will be somewhat different, will see librarians, whose name will

certainly have changed, arrive already totally exposed to technology, equipped with calculators and their own personally programmed portable micro-computers. The youth of today have made data processing part of their intellectual impetus and way of life, and they have also learned to master new languages. Several already plan to build micro-processors themselves which they will take from classroom to classroom, sometimes bothering certain professors who are more or less inclined to approve of this partnership. These are the youngsters who, by hundreds of thousands, easily manipulate Rubic's cubes or go in for mathematical games such as three-dimensional chess or Japanese "go". They have already been adapted to audiovisual techniques for a long time and, more recently, have begun to be fascinated by data-communications experiments conducted in conjunction with telephone networks on television screens in the home. With their schoolbags full of futuristic gadgets, this generation has a basically technological approach and their attitude toward the study of information science will be diametrically opposed to those of previous generations. Marshall McLuhan's observation that "any technology gradually creates a totally new human environment" is just as true in libraries as it is elsewhere.

At the very time when the primary importance of networks, centralization, collaboration through sharing, the pooling of

resources and the elimination of isolation on professional and other levels is becoming evident, a major paradox is beginning to appear. With extremely rapid and powerful transmission networks at their disposal, individuals can potentially be linked up to every source of information throughout the world; however, from this time onward, they might take refuge in total physical isolation, in a sort of ivory or rather "grey gold" tower, living only with terminals. Company presidents could manage their business from afar and researchers communicate with colleagues without moving from their desks; bankers in their New York or Tokyo offices would have access to any stockmarket in the world, while students would pursue private study programs in solitary rooms; and travellers could reserve airplane tickets from their living rooms, while even librarians, removed from libraries, could guide the research of their clients in the peace and quiet of their own homes. Anthropotechny will have to solve this contradiction: human beings will be closer than ever before but, at the same time, they are liable to live on earth like astronauts in a space shuttle. This paradigm of a society consisting of supra-autonomous symbionts, of men and computers living commensally in a reticular environment, seems fantastic enough, to be true, despite the absolute need for what should still be called team work or rather the intercurrent activities

of several complementary teams composed of men and machines alike, such as the ones which planned the LEM venture on the moon or that of the Columbia space shuttle, which even required the presence of an arbitrator-computer. The process of interaction and communication between documentary networks should be given immediate consideration and, as Guy Sylvestre, national librarian of the National Library of Canada stressed in November 1980 in the first paper on Canadian networks, it is with this end in mind that considerable efforts are being made both nationally and internationally at the present time to draw up the transmission norms and protocols which are essential for using decentralized open networks.

There are still an incalculable number of other phenomena which should be examined: the legal implications of operating networks, the question of royalties and fees related to using data banks and the dangers potentially involved in the growth of information monopolies or oligopolies. Computer terrorism, a threatening phenomenon, which has already appeared and seems to be uncontrollable, will be more difficult to fight than any other form of infamy. The perfect crime seems to have found the area in which it can be most successfully carried out. Only 10 percent of fraud is made public at the present time and almost only the unsuccessful attempts come to our attention. File

thefts make up 23 percent of the offences. What could be more attractive to the pernicious mind than defying computers by operations which involve no risk of bodily harm, demand no physical effort and which, until now, have been subject to ridiculous penalties, if not utter impunity, because of the silence maintained by the organizations affected; it is extremely ironic to note that, in the case of some offences, rewards have even been offered by the unthinking victims to their aggressors. How many cases have been pointed out which resemble that of Jerry Schneider who, after having embezzled one million dollars from a telephone company, promised to reveal the details of his crime in exchange for 40 days' imprisonment and then became one of the leading experts in tracking down computer terrorists? Only 10 percent of the 92 000 computers registered in France are protected by remote monitoring. Substantial investments are involved in setting up security systems. For example, 50 experts had to collaborate for a one-year period to develop the Multix system. Only 10 years ago, would it have been possible to imagine that information sabotage would become one of the objectives of the criminal world and one of the most threatening and costly scourges?

There are great stakes to be won at the end of the 20th century and their repercussions will be tremendous. At a time

when it is well known that mankind had the capacity to destroy itself, it is comforting to think that it also has the capacity to find new vitality and to speed up its evolution in a period when the brain, governed by supreme wisdom, will become the dominant force, perhaps enabling mankind to increase his potential tenfold in a society which uses its intelligence to foster a state of well-being far superior to that created by industrialization. Moral as well as scientific and technical development will be simultaneous; the creative imagination will receive a new impetus which was unsuspected until the end of this century.

Will the last years of the 20th century also make possible, to paraphrase Gérard Théry, a new expression of democracy and equal opportunity for men and nations alike because of the accessibility of these new means of communication?

The creation of a society and world-wide network based on information which are without racial, political, religious or territorial restrictions is the challenge confronting future generations faced with the demands of the computer; providing numerous services to man, it is this instrument which has transformed human life and which can compel mankind as it were to join forces, exchange views and collaborate peacefully rather than pursue a warlike course.

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PLENARY SESSION I

WORLDWIDE INFORMATION NETWORKS

by Marc CHAUVEINC
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Paris

In order to understand what a library network is, and before proposing a typology it seems necessary, even in a professional meeting to go back to the beginnings. That is to say to discover why libraries exist, what they are useful for, and why they cooperate together.

The fundamental mission of libraries is to provide information, by means of a tool: the document. Since the time of Ptolomy, libraries have been the best instrument created by man for the storage, retrieval and redistribution on demand of the intellectual product of humanity. Documents which reach the public through commercial agencies (publishers, booksellers) have a natural tendency to disappear because these agents can assure neither their conservation nor their distribution in the long run. But humanity needs ideas to live, so it needs the writings of preceding centuries. One no longer uses sackbuts or galleys but one still reads Aristotle, Plato, Sophocles, or the Bible. Only libraries have made it possible to maintain these ancient texts, making available the products of the past. We must, therefore, recognize and loudly proclaim, especially here at IFLA, that libraries have been created to continue the commercial race and to ensue in the centuries to come the continuity of human thought and its widest distribution.

This is a mission common to all libraries from the National Library to the lending library, which they must accomplish together. There is a unity of purpose in libraries whatever their divergences in the short term, and in the narrow view, a unity which must be proclaimed and defended. A return to our origins shows clearly what is the natural and obvious mission of the library: to provide documents. But this mission, sinple originally because of the small number of writings, has run up against a problem which is reaching the danger point: the experiential growth of published material.

No library can, as it could in the past, alone collect, conserve and distribute all the documents produced in the world. None can offer its clients a complete panorama of world literature, even in one precise discipline. The solution, here, is to share the work so that each takes on part of the burden: one can then hope that amongst them all they will preserve the totality of humanity's intellectual production. This leads to the birth of the concept of library cooperation.

However, the choice is not so simple. Since readers are all very similar, if not identical, libraries are obliged to buy the same essential documents and to have a high rate of overlap. On the other hand, many works are not bought at all. I do not know what happens in other countries, but I have to say that in France the deficit of documents vis-à-vis the production of publications is growing. The King Report warns that in the United States libraries had already slipped backwards 40% in ten years (1964-1974) in terms of acquisition of printed material.

In France it is estimated that there is a documentary deficit of up to 33,000 titles of journals and to 73,000 books per year. On the other hand, libraries have privileged and preferred clients, their own. We satisfy them first, and devote all our difficult decisions and draconian choices to the detriment of other libraries and their readers: each one for himself.

The statistics quoted and this conflict of mission demonstrate, if we need to demonstrate, that natural cooperation cannot be set up among libraries, that good will is limited, and that it is therefore essential to organize this cooperation.

This must take the form of a network. To use the term network, to describe cooperation, has three advantages:

- it is a useful conceptual tool coming from mathematics which allow interlibrary relations to be classed into several characteristic types.

- the cluster network centered around a node to which all the links are attached. Each link is independant of the others and cannot communicate with another except through the intermediary of the node.

- the hierarchical network is a cluster network in which each link is itself the center of a sub-network.

- the dencentralized network in which each element is in direct relationship with all the other elements, without a node as such. These models are found as such in information structure as in systems of interlibrary loan. OCLC is a network of the cluster type; interlibrary loan of the decentralised type.

- it is a descriptive tool which is interesting because of all that implied by the definition: many narrow links amongst the nodes of the network as if it were a net responsible for the retention of scientific information. There is perpetual movement along these links with permanent exhcnage among the organisms responsible for tracking and transmitting this information. This movement implies global equivalence of all the organisms and the responsibility of each vis-à-vis all.

The interesting thing about this word is that it allows us to describe different realities. A network can be an information network and deal only with material and telephone lines. It can also be organizational and define the rights and duties of institutions in the same consortium. It can be both at the same time.

It is a moral tool which involves setting the objective of collaboration between libraries and proposing a voluntary policy; which involves the network and its organisation in long range planning. Thus the notion of a network justifies creating a moral obligation. It permits proposing to the documentary organisms of the whole world an ambitious project intended to tranform present relationships, which are often incoherent, into obligatory relationships determined a priori and more efficient.

Each has its place and its mission.

If one wishes to realize the objective stated above, (that is to provide everyone, wherever and whoever he is with the information he needs) we, librarians, must decide on a grand design: that of creating a World Documentation Network.

Happily for us, present conditions (social, economic and technical) favour the development and establishement of such a project. Organizations like IFLA and UNESCO allow us to reflect and plan on a world scale. They offer structures through which it is possible to build this network. At the same time the world is contracting because natural liaisons between countries, so fundamentaL for our network, exist and are developing further: airlines, telephone, telex, telematics, permit immediate communication among all parts of the globe.

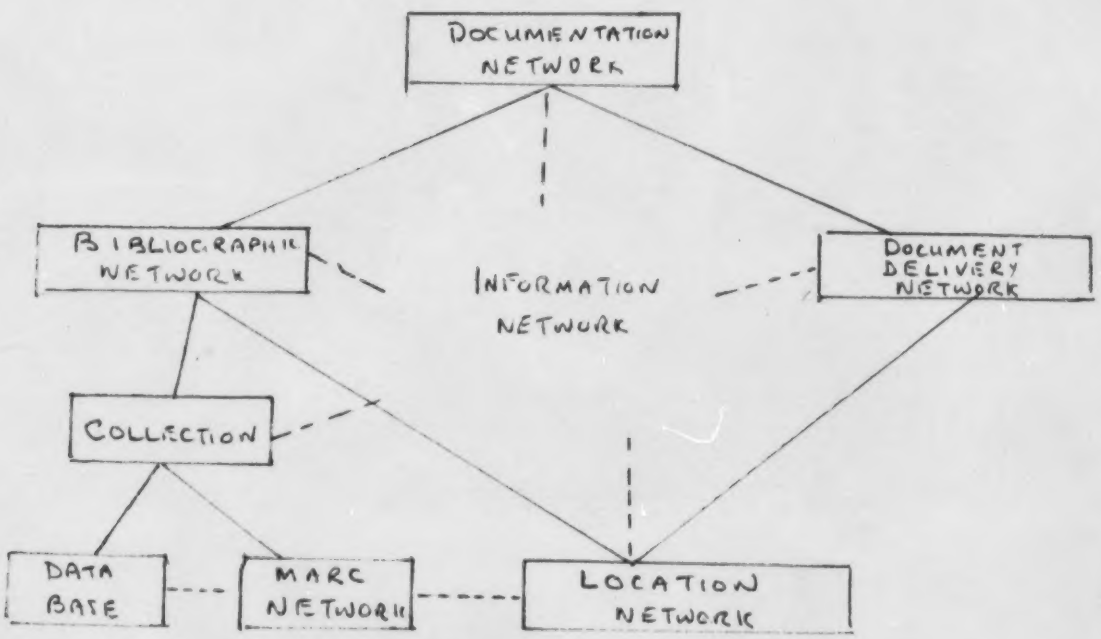
These communications necessary to commerce and industry have quite naturally brought with them consequences in the scientific domain. They have facilitated scientific contacts throughout the world and have created a single market for information whatever the source. They have brought about such development in exchanges of all kinds, even in the domain of libraries that from now on it will be impossible to remain isolated in ones own corner. All work implies knowledge of what is going on elsewhere.

Whether one wants it or not, we will be henceforth interconnected, inter-related, embarked on the same world ship and co-responsible in Paris as in Tokyo, in Montreal as in Pretoria, for the transfer of information. All our local projects should be registered in a global plan. This is one of the major moral consequences of the present development of networks. None of us can withdraw; we must understand each other, organize ourselves or disappear. We must work so that information, from producer to user, follows a fluent and continuous, rapid and complete course.

Only if this network is solidly structured can we be sure that information will reach, through well defined channels, every corner of our planet and the two principal objectives of libraries will be realised and finally brought together, objectives formalised by IFLA in its programs: Universal Bibliographic Control (UBC) and Universal Availability of Publication (UAP). The mission of libraries as defined above gives evidence that UAP is the principal objective and that UBC is only a way of attaining it. But both are closely related to the worldwide documentation network and one cannot develop without the other.

It is not sufficient, however, to affirm in theory this pressing obligation. It is necessary to go further and to determine the contours of the network and the details of its organization. The world documentation network is composed of the following elements or sub-networks:

- 1 communication network
- 1 bibliographic network
- 1 document delivery network according to the following diagram:



TRANSMISSION NETWORKS

No network can exist without close and rapid communication. Without communication it is impossible to establish fruitful cooperation amongst organisms. But methods of communication, though not created by libraries, are available to them and they use them.

The car, the train, the aeroplane, the mail, the telephone, the telex, and now electronic information, criss-cross the world in a very dense network which offers the possibility of establishing efficient and rapid exchange, though it is still ponderous and not yet rapid enough to transmit data en masse.

Amongst these methods of electronic communication, whether terrestrial or by satellite, by copper-wire or by fibre optic, are the most propitious for the transfer of information, especially since some specialized networks have come into being such a TRANSPAC in France and EURONET in Europe.

The attitude of libraries toward these carriers of information is simple: to use them.

But also try to form a lobby sufficiently powerful to obtain affordable rates and practical procedures. Information is not a commercial commodity and its cost should not be discriminatory. In fact today the costs of EURONET calculated for information retrieval would be too high for the transfer of complete texts.

In France, university libraries benefit from a postal exemption for mailing books. Why not broaden this measure to include international loans?

The other attitude which libraries should have towards networks is active participation in technical developments.

This can have important consequences for access to information but it must not result inshort-circuiting libraries by a parallel transfer of data. In order for a network of data transmission to be perfectly adapted to libraries, it is necessay to await fibre optics for terrestrial transmission, satellites for mass transmission, the video disc for storage, whether local or central, of entire texts. Finally this electronic network for data transmission must be worldwide and unify independant local or national networks so that the user can, with a single instrument (his terminal or telephone) consult a data base, find the documents, order them and obtain them.

BIBLIOGRAPHIC NETWORKS

As shown in the diagram above, this netowrk is divided into two branches, a location network and a bibliographic network, which is itself divided into a MARC network and a document network. The documentation network is not really a network but a certain number of intermediaries offering through electronic communication the possibility of questioning a computer. This is the point ofdeparture for research.

Next comes the MARC network, a worldwide collection of all publications of all national libraries permitting the establishment of an objective and unique identification for all these documents.

Besides standardizing the data, so important for identifying a reference and avoiding multiple citations, it provides the address of the document (city, date, and publisher) which alone permits one to place an order with a commercial organization.

The location network is the work of libraries which create and nourish it. As a complement to the MARC network which lists

all the printed material of the world, it provides a global inventory of existing collections. For numerous out-of-print works, it provides the single possible source of access to a document and is a witness, more than the other networks, of the voluntary cooperation of libraries and of their joint responsibility to provide documents.

Participation in a collective catalogue implies agreeing to lend ones' own documents and to help other libraries to satisfy their clients. In saying this, we approach the third network: that of access to the document, the physical and material delivery of information to the end user. Contrary to the three preceding networks which transmit electrical impulses, this network circulates heavy objects which now must travel by mail or vehicule.

Considerable progress is expected in this network through the transformation of these objects into electronic products able to be transmitted electronically. Telecopy, digitalisation of texts will change an important part of access and pose a technological and financial problem to libraries (these processes are still expensive) which is difficult to solve. But it merits careful study because it brings through electric transmission a new dimension to document access: it is immediate. This document access network can take several forms as analysed by Maurice LINE: centralised, semi-centralised, decentralised. This form depends mainly on the local conditions of each country and, in any case, is never pure. There is always a mixture of centralisation and decentralisation in every system. What is essential is that each network be organized, planned and structured in such a way that each member, that is to say, each library has a responsibility which is recognized and publicly displayed, and that it has the means to carry out this responsibility. A careful analysis sould verify for each type of document (book, periodical...) and for each discipline, which is

the best national provider, that is to say, which responds to the following criteria:

- highest rate of satisfaction
- greatest rapidity
- lowest cost

It is necessary to assign to each the necessary means for the acquisition and delivery of documents. In making the decision, such different elements must be taken into account as the different rate of use of documents. The local responsibility of each library, the quality of transmission and the ability to use the new techniques suggested above.

The question posed by this session was the importance of networks in the world of information. The foregoing shows that they are of primary importance because the network will be all and all will be the network. Whether it is organizational or natural, evident in contracts or partnerships or by physical liaisons, cars, telephones, telex, or computers, the network will be our daily bread tomorrow. No more splendid isolation. No more self-sufficiency. So, since in any case networks do exist, we may as well legitimize them and join together to establish them, and plan them for a long time. IFLA has thought about and prepared the bibliographic network MARC, national lists of publications. The catalogue of resources is always anarchic: a plethora and cooperation in the United States. Non-existance in the other countries. The network UAP, more difficult to establish is in its infancy. Apart from one or two countries, it is just beginning. The task in front of us is colossal: to establish a true MARC network for rapid access and low cost for all bibliographic references, to organize a national network of document delivery from national lending centers. These two networks will more and more take an electronic form, that is to say the form of immediate télétransmission.

Are we ready to take the plunge and invest important sums of money and intellectual effort in this enterprise which, let me repeat forcibly, conditions the future of our libraries?

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Library Networks: The Canadian Experience

by

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Meeting
269

Abstract

LIBRARY NETWORKS: THE CANADIAN EXPERIENCE

The history, development and current status of Canadian bibliographic and resource networks is traced. The relationship between geographic and demographic factors and network patterns is established. Canada is described as having a great number of large and small networks, but no single integrated and all-encompassing network. The author suggests that more attention be paid to human and economic factors affecting networking.

In the year 1900 the city of Montréal was host to the annual conference of the American Library Association. Among the four hundred and fifty-two delegates who gathered not far from here at the Windsor Hotel on Peel Street were many persons now recognized as pioneers of librarianship. Richard Bowker, founder and publisher of the Library Journal, was here to record the proceedings. Melvil Dewey attended, and so did C.A. Cutter; they were both well known for their systems of classification. Charles Martel and J.C.M. Hanson, colleagues at the Library of Congress, were also present; they were engaged in developing a classification scheme for that great library. Of those who attended about a third were identified as chief librarians, and indeed every major public, academic and government library in the United States and Canada was represented here by its director. It was the first time that Montréal served as the site of an international congress of librarians. But what made that conference more than a coincidential precursor of this one was its theme, which was cooperation among libraries, an activity we now prefer to call networking.

In 1900 the Chairman of the Cooperation Committee was Ernest Cushing Richardson, the Librarian of Princeton University. His Committee's report spoke of the need to eliminate the duplication of cataloguing work among libraries, and it proposed the establishment of a centralized bureau for cataloguing, one that would also produce and distribute catalogue cards. It recognized that the success of this bureau would depend on the standardization of cataloguing: to deal with this, the ALA established at that meeting a committee on cataloguing rules and subject headings. It foresaw that this accumulation of bibliographic records might serve as the basis for a national bibliography and union catalogue. In short, the essential elements for a bibliographic network were understood and articulated long ago, here, in Montréal.

Local arrangements for this conference were the responsibility of the Librarian of McGill University, Charles Henry Gould, an ardent believer in the advantages of library cooperation. Later in his career, in 1912, as Chairman of the ALA Committee on Co-ordination, he initiated the development of the first interlibrary loan code. Three years previously, in 1909, when Gould was President of the ALA, his keynote address to the conference described a national system of regionally located "reservoir" libraries, acting not only as storage libraries but as major reference libraries. He noted the possible relationship between these libraries and the production of bibliographic records, and spoke of the possibility of rationalized collecting policies. In short, he had a vision of networking, which he attempted to communicate to his listeners with these words:

> "One sees ... a chain of regional libraries throughout the United States and Canada, because the scope of such institutions ought to be avowedly continental if not international, and because in certain respects - in her relatively few libraries, her great distances and small population - Canada seems to be ideally placed for making an initial experiment of this nature."[1]

I mention these historical facts to demonstrate the network principles were understood long ago. The distinction between a bibliographic network for records and a resource network for documents was similarly understood. So was the relationship between these two networks. However, our predecessors had not found the word "network" or chosen the phrases "Universal Bibliographic Control" or "Universal Availability of Publications." I also wish to use this occasion to remember and honour our predecessors, and to identify Charles Henry Gould as the father of Canadian networking. Obviously, we have had a long time to develop networks in Canada. But to what extent have we realized Gould's vision?

In the first place, he may have been wrong in believing that Canada provided an ideal environment for a network experiment. A humourist has said of my country that it has too much geography. This is true. Physical distances are great, and the population is unevenly distributed from coast to coast along a relatively narrow band of habitable territory. We have two official languages, deriving from two different European cultures with different conventions and traditions. Our two communities have attracted immigrants from around the world, and millions have arrived here. Approximately one out of six Canadians was born in another country. The political and economic organization of the country has combined with these other factors to create strong tendencies toward regionalism and provincialism in all aspects of life. Ours is not a homogeneous nation with an identifiable single culture. Every region has its own special character.

As for libraries, they reflect the national situation. Information resources are also unevenly distributed across the country, with the concentration being in the triangle formed by Toronto, Ottawa and Montréal. As a result of its relatively small population, less than twenty-five million, Canada is a net importer of information in all forms. Most of what is read, or seen in theatres or on television, originates in other countries, mainly the United States, France and the United Kingdom. This certainly provides for a rich experience, but it militates against the development of a national culture; thus our cultures, both French and English, require constant protection and support by both federal and provincial governments.

Resources are also unevenly distributed among types of libraries. In the last two decades, academic libraries have been growing at a faster rate than public libraries, and they have enjoyed greater access to computing equipment. National library

services and collections have also been late to appear in our history, but have grown dramatically in the last quarter century.

These factors have tended to make library networking in Canada localized, ad hoc and unintegrated. It is almost natural for a group of libraries of one type to create within a region or province or city small networks for the sharing of bibliographic records and collections. The information and communications technology essential to contemporary networking having been developed to overcome Canada's great distances, our greatest problem has not been in establishing networks, but in coordinating their development and providing for their integration on a national basis. To assist in this work, we must rely on both our library associations and our national libraries, themselves working in harmony.

Successful networking on a national scale is based on the development and adoption of standards of various kinds. Since we import so many publications from other countries it is essential for us to use standards developed in those other countries, adapting them to the Canadian situation as necessary. For example, the LC classification is widely used in Canada, but with special expansions for Canadian literature and history, developed by the National Library of Canada. The NLC has also developed a bilingual personal and corporate Canadian name authority file, used in our national bibliography Canadiana and also by LC, thus guaranteeing international uniformity. Subject headings present a formidable problem. Although LC subject headings are widely used in Canada, they arrive here in the English language. The development of a standard list of subject headings in French takes place at the Université Laval, working in cooperation with the Université de Montréal, the Bibliothèque Nationale du Québec and the National Library of Canada;

this list is based on the work of the Library of Congress, is furnished with indexes in French and English, and is now in machine-readable form. This version has been mounted by the University of Toronto Library Automation Systems, which will enable cataloguers to search for subject headings in French and transfer them on-line to MARC records originating in anglophone countries. Tape versions from UTLAS will be used by the National Library of Canada to produce a printed edition with updates. This illustrates the complexity of networking in a bilingual country, but also demonstrates that it can be done.

Working through the Canadian Library Association and the Association pour l'avancement des sciences et des techniques de la documentation, Canadian libraries participated in the development of Anglo-American Cataloguing Rules I and II. Translation of these was undertaken by librarians at the Université de Montréal and the BNQ; ASTED holds world publication rights. As for machine-readable bibliographic records our CANMARC format was developed by a task force of the NLC, is closely related to other MARC formats, but is unique in being designed for use in both official languages. The NLC operates a MARC distribution service, reformatting other national tapes into CANMARC format, and selling both complete tapes and selected records. Through this service the NLC also distributes the CANMARC version of our own national bibliography. In this connection, it should be mentioned that the NLC operates a Cataloguing-In-Publication programme, contracting out this work to libraries located in regions; for example, the University of British Columbia Library provides CIP copy for all participating non-government publishers in western Canada, and this copy is used by the NLC as the starting point for its own CANMARC record. The foregoing illustrates the variety of network arrangements employed to ensure a consistent national bibliographic record, and one that can be related to national and international networks.

As for computer-based cataloguing services, Canadian libraries have a number of alternatives, the principal being the previously mentioned UTLAS. Development of the software on which this service is based commenced before that of OCLC, and UTLAS today remains second to OCLC in the number of its users in North America, although a distant second. Some users of UTLAS have themselves formed provincial consorstia, for example RIBLIN in Quebec and BCUC in British Columbia. For its part, the National Library of Canada operates a cataloguing service for federal government libraries based on a version of DOBIS. New modules for that system are used to produce the national bibliography Canadiana and maintain the National Union Cataloguer of Books and Serials.

There are other smaller systems, some developed, some developing. BADADUQ is now emerging in its second version, linking ten campuses of that institution. Several libraries in Canada have installed an on-line circulation and catalogue inquiry system developed at Guelph University, and known as GEAC; work is proceeding on developing a catalogue maintenance module and on creating links between GEAC users. Similarly there are other commercially available circulation systems with the potential for growth into comprehensive operating systems for libraries, and ways must be found to relate these individual installations to networks.

In respect to the other bibliographic network, the information retrieval network, Canadian libraries can access directly a number of major service centres such as BRS and Lockheed/DIALOG. There are also Canadian brokers, such as INFOMART, QL Systems and Informatech, and our national science library, the Canada Institute for Scientific and Technical Information has for over a decade provided access to a variety of major data bases as well as to a number of smaller uniquely Canadian data bases.

There are, in fact, so many bibliographic networks of various kinds that many Canadian libraries participate in several. What is missing in this increasing proliferation of government and private-sector library and information services is integration. This is a matter of concern to all Canadian librarians, and the NLC has responded through its Office for Network Development by carrying out research, creating task forces and committees to deal with specific areas, and working with other government agencies and the communications industry to overcome problems. The major problem being the inability of existing systems and networks to relate to one another, the focus of attention has been on the development of computer-to-computer protocols for the communication of machine-readable information. A major experiment is under way at the present time, under the name of iNet/Gateway trial. This has been described by Ms. Cynthia Durrance, Director of the Office of Network Development, in her paper delivered to the Section on Information Technology on Tuesday, August 23rd and is being demonstrated here in the exhibit area at the NLC/CISTI booth. If this experiment succeeds in showing how incompatible systems can communicate with one another, we will have taken a major step forward in solving any problems arising out of the regional tendencies of our country.

Thus, there is in Canada a highly developed bibliographic and communications network, but it is tangled. It was not centrally planned, because our political and social conventions make central planning difficult. It is not a perfect nor a logical network, but it functions, and with further technological development and collective action, it will function better. If these experiments succeed we will be able to integrate regional and local systems on a nationwide basis, while preserving their autonomy.

I turn now to a discussion of the resource and document delivery network. In 1900 it was reported that Canada's libraries contained about 2½ million volumes. Today Canada's libraries probably contain more than 100 million volumes. It is an impressive figure. From the network point of view, the question is: are these materials universally accessible?

Since 1950 the NLC has provided a location service through its Union Catalogue of Books. Like most such files, it was maintained on cards submitted by about three hundred and fifty major and special libraries in Canada. However, the card file was closed early in 1980, and since then all incoming accessions have been entered into the DOBIS system to create one of the few on-line union catalogues in the world. The Union List of Serials is similarly maintained on DOBIS. In recent years the NLC has responded to about 175,000 bibliographic search requests annually. Although the NLC is a relatively young institution, 26% of these requests can be satisfied from its own collections. For half of the requests, locations are found in other Canadian libraries. For 24% no location is found. However, the NLC is not the only source of location information for Canadian libraries. CISTI maintains the Union List of Scientific Serials in Canadian Libraries, which is available both in published form, and on-line. In addition, there are a number of provincial union catalogues, recording the monograph holdings of smaller libraries that do not report to the NLC, and there are numerous union lists of serials at the provincial and local levels. Although the primary use of UTLAS is for cataloguing services, it too can be used to obtain location information. Canadian libraries also have access to many location tools and services originating in the United States, and some also participate in their development, thus the holdings of Canadian libraries may sometimes be found outside our national borders. While the situation may cry out for rationalization,

one thing is true: an informed librarian can usually locate a desired item, either in Canada or the United States. In this respect we are more fortunate than many nations in the world. But can the items we locate be obtained quickly?

Although most libraries use telex or electronic mail for obtaining location information, and increasing numbers use these same means of communication for sending requests for items, the publications themselves, or photocopies of them, are usually sent by mail. Postal services, as we all know, can be slow. It is not fair to say that Canadian postal services are always slow ... sometimes they are very efficient ... but it is true that they are inconsistent and can not be relied upon for regular service. For this reason, many libraries have sought other forms of transportation. There are a number of regional, provincial and local courier systems, and within their geographic areas these function well. Notable examples are the systems PEBUQUILL in Québec and IUTS in Ontario. These systems intersect in Ottawa to ensure rapid delivery among libraries in these two large and central provinces. Moving library materials between distant points is best accomplished by special air courier services, although these are expensive. CISTI and the NLC have now established a bulk air freight delivery system to a number of cities very far from Canada's capital: Halifax, Calgary and Vancouver. In any resource network, smaller libraries will inevitably depend on larger libraries. In Canada, the two national lending services based at the NLC and CISTI supply the greatest number of items, about 186,000 items in 1980/81. Because university libraries in Canada generally have the largest and richest collections, they are also a major source of materials on interlibrary loan. But as the number of loans increases, or, if you prefer, as networking succeeds, the amount of work performed by these libraries increases. Unfortunately, many large libraries in Canada and the U.S. are experiencing a

decline in financial support, and some have therefore imposed an interlibrary loan fee, a step which shocked many librarians who had assumed that such services should always be provided at no cost. This break with tradition has awakened librarians to a new understanding of the difference between free information and freedom of access to information.

To summarize, there are many library networks in Canada, and undoubtedly there will be more. These networks are not perfectly integrated or coordinated, and it is doubtful that they can be. Canada has developed excellent national services of other kinds in the areas of transportation and communication, but it can not boast of a Great Canadian Library Network. If one attempts to imagine such a network, one sees that it would be so large and complex that it would suffer from the kinds of bureaucratic, managerial and economic problems that now affect our postal services. Thus there is virtue in our present mixture of large and small networks, operating for different purposes in different geographic areas. I believe it is now theoretically possible for any Canadian citizen to obtain a copy of any specific published item he wants: the network structures to make this possible are all in existence, despite their complexity. But we must admit that in Canada there is a gulf between this theoretical possibility and actual practice. Why?

I suggest that there are two factors, not the subject of adequate attention, which can make the difference between success and failure in networking, both in Canada and in other countries. These two factors are human and economic.

Much of the literature of networking stresses theory, methodology, organizational structures, and computer applications. But ultimately all attempts at coordinating human activity depend on the participation and commitment of individuals, and so it

is with networks. It is not easy to obtain this commitment partly because unlike the libraries in which we work, networks are invisible, or if they have a visible component like a computing centre or a storage library, they are at a distance. Thus networks do not have the physical presence of the libraries in which we work every day. Our own libraries take a natural precedence in our consciousness. Networks become a second or lesser priority.

Thus it happens that librarians often fail to create or sustain the essential conditions for networking, beginning with the most basic: standardization. Whether we consider cataloguing rules or MARC formats or interlibrary loan codes, librarians are predisposed to make those little departures from standards that suit the immediate convenience of their own libraries, regardless of the consequences for present or future networks. We are an army that is never in step. What we require is a reorientation in our thinking about library services, so that we think in terms of networks as well as in terms of individual libraries. To achieve this intellectual reorientation and commitment, I believe that we must rely partly on our national libraries, partly on our teaching institutions, and ultimately and perhaps most importantly on the administrators of libraries. In Canada our national libraries have provided a good measure of leadership, and I believe our schools of librarianship are doing their best to inform a new generation of librarians about the principles of networking. But it is the old generation, our generation, that must demonstrate to our working colleagues our belief in the necessity for and viability of networks. If the director of a specific library is not committed to the objectives of networking, and does not inculcate this commitment in his subordinates, that library will not participate effectively nor benefit from a network of any kind. This is the human factor so often missing in network development.

The second factor affecting networks and still one imperfectly understood, in my opinion, is economics. I refer to what might be called the economics of information transfer in society. For their survival and effective functioning our societies depend on the constant transfer of information of all kinds via all media. Among these media are our libraries, acting as agencies for the collection, storage and transmission of information produced by other groups in society, principally publishers of books, journals, newspapers, microforms, etc. At every step of the process, some costs are incurred. The author, the publisher, the printer, the papermaker, the bookseller, the data base compiler, the information retrieval agency, the librarian, all must be paid. The question is: who pays, and when? To what extent is the information transfer process paid for by the government, or by the individual? What kinds of information should be available at no direct cost to the public, and for what kinds of information should the individual citizen expect to pay? These questions will be answered in different ways in different countries, but they lie behind the more specific questions that are now raised in a network context. Should bibliographic records be in the public domain? Should there be interlibrary loan fees? Should libraries provide free access to electronic information retrieval services? Should libraries pay more for subscriptions than individuals? Should there be public lending right legislation? Should copyright laws include a reprographic right?

In Canada and I believe also in the U.S. there is now uncertainty and tension between public and private sector information services. Those in the public sector speak of social responsibility and the requirements of a democratic society. Those in the private sector speak of the relationship between economic reward and the creation of new information. There is a pressing need, I believe, for a new

examination of the economics of information, one leading to the articulation of a new philosophy, incorporating a statement of broad social objectives, a philosophy which will make it easier to answer specific questions and to resolve problems.

The need for this philosophy will be all the more urgent as the technology of information storage and transfer develops, and more information is converted to electronic formats, both digital and visual. Libraries today are mainly print-based institutions. Their collections consist of published materials which they own and which they can put to any purpose at any time. In contrast, the world of electronic information is a world of unpublished information: it remains unpublished and centralized in a data base until it is demanded. If, for example, many scholarly journals are superseded by electronic journals, where will the data bases be located, who will control them, how will they be made available on a universal basis, what will the costs be and who will pay them? For Canada, now and forever a net importer of information, these will be major questions in the coming decades. And they are major questions for those involved in the development of UAP concepts and practices.

In this paper, I have attempted to display many facets of the Canadian experience in library networks, the main point being that there is no single network, but a multiplicity of overlapping and interdependent networks. There are some practical difficulties of network linkage to overcome, and we are at work on these. There probably never will be a time when there is a fixed and immutable set of arrangements and interconnections. The Canadian network environment is dynamic, and there is no end point. Perhaps that is its strength: that it must and will always be empirical, pragmatic and flexible, evolving in response to new technological developments and changing user needs.

Footnotes

1. Gould, Charles Henry. "Co-ordination, or method in co-operation." American Library Association. Bulletin, 3:122-238, 1909.

Abbreviations

ALA	American Library Association
ASTED	Association pour l'avancement des sciences et des techniques de la documentation
BADADUQ	Le Banque de données automatisées de l'Université du Québec
BCUC	British Columbia Union Catalogue
BNQ	Bibliothèque nationale du Québec, Montréal
BRS	Bibliographic Retrieval Services (Latham, N.Y.)
CIP	Cataloguing-in-publication
CISTI	The Canada Institute for Scientific and Technical Information
CLA	Canadian Library Association
DOBIS	Dortmunder Bibliothekssystem
IUTS	Interuniversity Transit Service (Ontario)
LC	Library of Congress
NLC	The National Library of Canada, Ottawa
OCLC	Online Computer Library Center (formerly Ohio College Library Center)
PEBUQUILL	Prêts entre bibliothèques des universités du Québec/Universities Interlibrary Loans
RIBLIN	Reseau informatisée de bibliotheques/library information network
UTLAS	University of Toronto Library Automation Systems

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The Role of Libraries in the Information Network

by

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Meeting
269 51

The Role of Libraries in the Information Network

When UNESCO began the UNISIST-Project in the early sixties, the world of information was still relatively uncomplicated. If merely subject-oriented abstract services for all disciplines would be organized on a world-wide basis, then it was believed that the informational needs would be sufficiently covered. The organization of the scientific and technical informational sources seemed therefore to be a question of communication among scientists with the extreme exclusion of the librarians and even the documentalists who had been individually consulted for advice in the beginning phase of UNISIST.

In the meantime, however, the conceptions of the flow of information have become considerably more complicated--not in the least due to the experiences with UNISIST, but also due to the broader basis of experience with electronic information banks. In place of a simple "relation abstract service" -- in the traditional form or as an electronic data bank -- on the one hand, and scientists on the other hand, a complex organization based on the division of labor has evolved which is only adequately representable in the form of a network. In a network, the information transfer from the producer of primary information to the end user of this information takes place in six steps:

Data base producers,
Data base vendors,
Data bank retailers or hosts,
Communications network vendors,
Information dissemination centers, and
Institutions for the provision of literature.

At which of these levels are the libraries active? Which responsibilities do they have within the information networks? In this paper, I will attempt to show that

they are active at almost all levels of the information transfer process.

1. In addition to abstract services and documentational institutions, libraries are also producers of data bases. Naturally, not every library produces an informational data base or data bank. However, here one needs only be reminded of the example of the National Library of Medicine in Bethesda, Maryland (U.S.A.), which produces not only one of the oldest, but also one of the largest data banks in the world. Already in the early sixties, it offered its conventional abstract services, the Index Medicus, also in magnetic tape version, which serves as the basis for the development of countless on line data banks over the entire world. Other libraries have followed this example, even through the dimensions of their data production cannot usually be compared with those of the National Library of Medicine. To give only one example here, the Universitätsbibliothek (University Library) in Frankfurt constructed a data bank for linguistics and literature research in a similar manner.

As a rule it is assumed that the production of subject-oriented data bases does not belong to the usual responsibilities of libraries. This is normally the task of special documentation services which -- at least for the larger scientific and technical disciplines -- lie in the realm of specialized, subject-oriented organizations. Not even the traditional documentalists who are united in the FID play a leading role in this area, but rather those international associations consolidated in the ICSU which through combined efforts have established the ICSU Abstracting Board. However, that does not mean that libraries -- with the exception of individual cases -- can be excluded from consideration as data bank producers. It is true that they produce subject-oriented data banks only as an exceptional group, but they are increasingly emerging as the producers of two further types of informational data

banks which have achieved growing significance in the last years in addition to the subject data bases.

On the one hand, countless national libraries which produce the national bibliographies of their respective countries have offered this bibliographical data in the form of magnetic tape as the basis for developing informational data banks in the last years. This is true not only for the large national libraries in Australia, France, Great Britain, Italy, Japan, Canada, Spain and in the Federal Republic of Germany, as well as for the Library of Congress -- though in a somewhat different form since it does not produce a national bibliography --, but also for several smaller European countries. Several of these national libraries have built up data banks themselves using this bibliographic data, as for example the British Library (BLAISE) or the Deutsche Bibliothek (BIBLIO-DATA). Using such electronically accessible bibliographic information storage facilities, fully new groups of users could be reached. Others, such as the Library of Congress, have delegated this to other data bank retailers.

These data banks very rapidly developed the tendency to be more than merely informational data banks. They have achieved the status of data processing units for other libraries -- in part even with functions of prime importance, as has been achieved in the U.S. The On line Computer Library Center (OCLC) in Columbus, Ohio, is the prototype for this development in that it offers the products of the national libraries in the form of secondary services for other libraries. The same is true -- for the most part -- for BLAISE of the British Library. For the data-producing libraries, it is unimportant in which forms and types of services of the data bank vendors or hosts (-- and OCLC can be treated as such --) provide the data produced by the national libraries. In this type of service relationship, the national libraries also remain data bank producers.

On the other hand, libraries have developed data

bases which fulfill a specific reference function. Even these data bases naturally have conventional predecessors in the book form and card form: the union catalog or the central index to collections. Especially in the area of union lists of periodicals, this conventional form of local, regional or national periodical lists has not proved sufficient. Precisely the experiences which have been made with the large subject data banks led to the general challenge to make the provision of literature as rapid as the process of information transfer. As the last two conferences of the UNESCO Program UNISIST have demonstrated, a world-wide need exists for a definite acceleration of the literature procurement procedures. This forces the libraries to provide collection indexes in the most current form possible which can then direct the requests for literature to the appropriate source. Here, therefore, is the starting point for the development of periodicals data banks, as has been developed, for example, in the Federal Republic of Germany by the Staatsbibliothek Preußischer Kulturbesitz (State Library of the Prussian Cultural Properties) in Berlin. This data bank is accessible on line for all users via the general European information network EURONET.

Also in the case of the hosts which provide services for other libraries, the same sort of reference data bank usually evolves which then, however, not only provides locational references for periodicals, but also for monographs. Here, countless examples could be given, for example, for

-- the U.S.: the OCLC, the Washington Library Network, the Research Libraries Information Network

-- Canada: the University of Toronto Library Automation System

-- Great Britain: the Birmingham Libraries Cooperative Mechanization Project, the Scottish Libraries Automation Cooperative Project, the South West Academic Libraries Co-operative Automation Project

-- the Federal Republic of Germany: the regional library computer centers, above all, the Hochschulbibliothekszentrum des Landes Nordrhein-westfalen (College and University Library Center of the State of North Rhine-Westphalia) and the Deutsche Bibliotheksinstitut (German Library Institute).

2. The second level is formed by the data bank vendors. Normally, one can assume here that those libraries which produce data bases also offer them on their own to the data bank retailers and hosts. Usually a national library does not delegate the marketing of its electronic products to another institution so that, for the part of the cycle discussed here, the differentiation between data base producers and data base vendors has no distinctive relevance.

However, it is not uncommon in the traditional national libraries that the solicitation and sales -- and often also the typographical production of this bibliography -- is not assumed by the national library itself, but rather consigned to a publisher. Thus, for example, the Cercle de la Librarie publishes the Bibliographie de la France which is edited by the Bibliothèque Nationale in Paris. Therefore, it is very easy to conceive that in the future, there will be national libraries which will similarly make use of a commercial enterprise for the marketing of its electronic services.

3. At the next level, that of the data bank retailers or hosts, libraries appear only very rarely. Usually they give this highly technological function to other organizations, in many cases to institutions which have been founded solely for this purpose as for example the On line Computer Library Center (OCLC) in the United States or the regional library computer centers in Great Britain and in the Federal Republic of Germany.

These examples alone show that an interesting development has evolved in the area of the hosts in the last ten years. In not a few cases, libraries have used a common computer for their data banks, however, the tendency seems to be growing stronger world-wide to establish special hosts for library-oriented data banks which could then, naturally, also serve as library processing centers.

In the sixties, librarians had the common goal to equip every library with its own computer. This goal was fundamentally determined by the technological possibilities of the second generation data processing units which were still entirely set up for BATCH processing. The more restricted the actual area to be automated, the easier it was to realise this ideal. Libraries which, for example, wanted to confine their automated systems to circulation procedures, could include their own data processing unit in their plans earlier than others. However, even for the cataloguing routine or the serials record procedures, the capacity of such a unit was not sufficient even if all procedures had been executed exclusively in BATCH runs. During a specific phase of the development, therefore, the possibility of cooperation with a computer center outside of the library arose -- whether it was with a university computer center for the university libraries, or whether it was with a computer center of the local public authority for public libraries. Since, however, the demands of the libraries on data processing continuously grew with the increasing interest in on line processing, serious friction between the desires of the libraries and the possibilities of these computer centers resulted very quickly and could only be remedied by the installation of specialized computers for this purpose. The On line Computer Library Center is probably the first establishment to take this spectacular step.

What advantages do data bank retailers of the type and structure of the On line Computer Library Center have in contrast to other solutions such as university computer

centers for libraries? In the first place one must not overlook the fact that specialized data bank retailers are considerably better able to take care of their genuine circle of customers than less specialized data bank retailers. While libraries as information transfer centers--which will receive further comment later in this paper -- have had to adjust to the abstract standards established by these data bank vendors, it can be expected from a specialized data bank retailer that he adapts his products and services more to the specialized needs of his clientele -- especially since these needs become easier to determine with the greater homogeneity of the customers.

In the second place -- and this is even more important -- such a data bank retailer can offer a much more extensive service. He does not want to disseminate only information but also services. Libraries not only search information in these data banks; they utilize the hard and software for executing various work procedures, for example, cataloguing, inventory, serials, recording, circulation procedures, as well as budget control -- to name only the most important work procedures. In this respect, typical library data bank vendors are usually more than only information dealers -- they become dealers for various services. On the other hand, the On line Computer Library Center provides the best example for such a development since it originally possessed a very limited spectrum of services which, however, over the course of time could be expanded considerably. All other comparable library-oriented data bank vendors have proceeded from the service aspect in setting their objectives and from the very beginning have considered information transfer only as a by-product. However, here it is important to note the Deutsche Bibliotheksinstitut (German Library Institute) which offers the Periodicals Data Bank of the Federal Republic of Germany via its computer. The Periodicals Data Bank is primarily still a purely informational data bank, but shows similar tendencies for its expansion as have evolved for the On line Computer Library Center.

4. The business connected with communications network hosts takes place fully outside of libraries. As a rule, this is the legally-established responsibility of the country's national postal administration. And even in those countries in which telegraphic communication is not included in the state postal monopoly -- as for instance in the U.S.A. -- libraries will rarely be concerned with the problem of the technicalities of communications transfer, whether it is via cable or wireless. Nevertheless, this part of the information network is not without considerable significance also for libraries which are linked up to the informational network at various levels. On the one hand, the vendors of communications networks determine the fundamental technical stipulations for data communications. As long as a data bank is used only internally, that is, with relatively short transmission lines which in fact belong to the computer, only the complexity and the specialized technology of the hard and software of this unit create the conditions for information use. In a broader data communications network, however, in addition to these special stipulations, there is also the general standardization of this network. It must not only comply with the technical stipulations for long-distance data transmission, but also take into consideration that data processing units of different manufacturers and different capacities will be coupled within the network. As soon as this communications network extends beyond national boundaries, additional problems arise due to the diverse national traditions. This forces the development of compatible communications transmission systems as have been developed for long-distance data transfer inWest Europe via the information network EURONET DIANE, to which, for example, the data banks of the British Library and the Deutsche Bibliothek are connected.

5. Libraries are increasingly more active as information dissemination centers. These establishments, which similarly were also not included in the UNISIST philosophy,

are necessary for four reasons:

a) First, it is not worthwhile for most of the scientists and researchers to obtain terminals with a link to an information network themselves, since the costs for this are far above the actual informational need. They therefore prefer to use intermediary services which are partially commercialized in the form of information brokers, but frequently also integrated into existing public institutions, primarily in libraries.

b) Secondly, retrieval in on line data banks has however proved to be so complicated that an untrained searcher cannot work with this informational possibility without technical assistance. Industrial enterprises, industrial unions, chambers of commerce, etc., have therefore established corresponding information centers for their special area which then relieve the scientist of the technical handling of the on line data banks. For the large realm of research outside of industry, this responsibility has to a great degree been passed on to the libraries and partially to book dealers.

c) Thirdly, the experiences of the last years have shown that it is not appropriate to merely have access to a single data base since average questions which can only be satisfactorily answered with the use of several data bases occur more frequently than originally expected. The customer usually does not want to search a specific data base; he wants to have a specific problem solved with the help of whatever data bases are available. This, however, requires greater organization which occasionally can call upon various data bases to answer the query.

d) The tendency of the customers just noted, namely not to want to consult a specific data base directly, but rather to arrive at solutions, leads to the fourth point that the customer is not satisfied with a purely factual notation of the literature. In countless cases, he would

really like a more comprehensive service -- at best a substantial solution to his problem. However, libraries are not usually in the position to provide finished solutions to the problems. In this respect, they are certainly surpassed by the considerably more expensive information brokers. However, they can -- without exception -- accomplish more than the normal information dissemination centers since they can also provide the literature which the information data banks give only in the form of a bibliographical title entry or an abstract; the library then also provides the original literature or a copy thereof. Therefore, libraries as information dissemination centers epitomize the union of information transfer and provision of literature -- an offer which most users of informational data will want to take advantage of.

These are the reasons for libraries to be active as information dissemination centers. For example, while the library-oriented data base vendor is used primarily by libraries for their internal work procedures, the services which libraries offer as information dissemination centers within the information network, present outdoor services for their readers. Since time immemorial, the imparting of information through reference services has belonged to the traditional responsibilities of libraries. The degree to which a library has fulfilled this responsibility, depended fundamentally on the makeup of its staff and occasionally also on the self-conception of the librarians. Here, certainly great differences between public and academic and research libraries can be determined - naturally with a definite advantage in the services of public libraries - and probably also between anglo-american and continental European libraries, although there has been no systematic comparative study to my knowledge on the topic of reference services in libraries.

The various traditions are naturally also expressed in the willingness to be active within the information network as an intermediary center. Thus, the number of

libraries which have direct access to the data bank hosts is considerably larger in the U.S. than in Europe. Nevertheless, an analysis of the composition of the information network ODIN in the Federal Republic of Germany (and as the German part of the European network EURONET) shows that 24 of the 74 information dissemination centers linked up to ODIN are libraries -- primarily university libraries which however mostly have access to only one or two hosts for searching. That, of course, is because of personnel reasons, among others. Each subject-oriented data bank requires a specialist for working out the search profile and for evaluating the results, and this special personnel cannot be acquired without considerable burden on the budget. This problem shows that the development of libraries into information dissemination centers must be viewed as a process of adjustment of the libraries to the new technical conditions which then, because of the additional tasks, impose an additional financial burden on the library. Here, however, the advantages and the additional burdens must be carefully weighed against each other. In the end, libraries are not only institutions for provision of literature, but rather also institutions for providing information. Therefore, they should make serious efforts not to miss the chance for linking up with the modern technical forms of information dissemination.

6. Libraries as institutions for the provision of literature -- does one have to say a single word more? Isn't that the inherent and original task of libraries, long before there were data bases and information networks? When I refer to the aspect of this work as being inherent, then it is not to repeat old clichés about the meaning of libraries, but rather to question to what degree traditional services of the libraries have changed under the influence of information networks, or at least should change in order to meet the new demands.

It can hardly be debated today that a library -- however large it may be -- can no longer satisfy all the needs of its readers. The few libraries which still fight a sheer Don Quichottian battle to achieve comprehensiveness will be the first to admit the hopelessness of this task -- when the librarians are honest with themselves -- since they experience failures daily. Therefore, since the middle of the last century, various forms of library cooperation have developed which have mutual assistance in satisfying the readers' requests as their objectives.

Since its founding more than fifty years ago, the IFLA has united these library networks into -- as one would like to say in modern technology -- an organization for international interlibrary loan. Whether this system has always functioned to full satisfaction remains to be seen. However, the conventional system of provision of literature is no longer appropriate to meet the demands which the electronic information network places on libraries.

In essence, there are two problems which the libraries are confronted with in their function to provide literature with respect to informational data banks. First, the comprehensiveness of the information of these data banks far exceeds the previous conventional information storage possibilities. The number of journals which are evaluated and the quantity of titles which are being fed into the computers has grown in great proportions, even in those disciplines which have always been well-documented, such as chemistry or medicine. However, it is not only the sheer quantity which has increased. The increasingly geographical distribution of journals has most likely had a considerable effect on libraries. It is true that statistical investigations on the citation frequencies and actual use still prove that a relatively small number of all the professional journals within a discipline

represents the primary medium for scientific advances in that field. However, anyone who in his daily library work has experienced the distinctive perserverance with which researchers insist upon the procurement of journal articles from the most remote journals, knows that it is no longer sufficient today when a library possesses direct or even indirect access to only the core of standard journals within a discipline.

Complicating the matter even more is the fact that in the last generations, science has indeed become international. The six or eight countries which determined scholarly and scientiiic trends and advancement for a long time are supplemented today by a large circle of scientists who live in countries which do not belong to these previous"core-countries." Which library, today, can do without Japanese, Indian, even Arabian and African journals? Can it include all of them in its own collection? As a rule, no. Here, to rely solely on interlibrary loan, or on national or international interlibrary lending in its traditional form, is certainly not enough. Because of this, precisely here is where the second problem arises, namely that of the speed of the provision of literature. The international information networks have made their users demanding -- above all when it concerns the rapidity of obtaining information. Anyone who can obtain information about literature in seconds via the computer view screen will easily become impatient when he has to wait for the procurement of the literature not days, but weeks and in international interlibrary loan, often months. Here, a definite weak spot in the traditional system of the libraries' provision of literature has been exposed. Naturally, there are attempts to remedy this.

To this end, for instance, Lockheed has long provided its information system with a special service which delivers the literature referred to in its data bank in the form of copies, and many libraries serve in the capacity as distributors of this literature. However, these are the first

attempts, and I rather doubt whether the solution traced here which inexplicably connects the procurement of literature with the operation of data banks should be viewed as the optimal solution.

Libraries have developed other models and have partially realised them. The founding of the British Lending Library, today a department of the British Library, represents perhaps the most spectacular solution -- which, however, at the time of its founding, still began entirely according to the conventional forms of imparting information. It has made great efforts in the last years to take on a greater role in the international provision of literature. Other central libraries -- such as the Technische Informationsbibliothek (Technical Information Library) in Hanover -- have followed in principle. In this way, a double system of provision of literature has evolved -- the conventional one belonging to the national or international interlibrary loan which functions either free of charge or relatively inexpensively, but very slowly, and is firmly bound to the regulations of the lending agreements, and the newer, special service of accelerated literature procurement which takes place primarily via Telex communication. This latter service has developed the rudiments for an on line transfer of information, but naturally requires considerably higher fees.

This second system has, however, not yet achieved its best possible form even today. The European Community has appointed a commission to investigate the problems of document delivery using the implementation of the entire range of modern technology from facsimile transfer to full-text storage. In this respect, however, it is at this time still fully unclear as to which functions -- if any -- will be retained by libraries in this fully electronic system. These plans may still be primarily dreams of the future. Even the founding of a publishers' association for electronic publishing, in which six large publishing houses have consolidated, shows that the first effects of these considerations can be expected shortly.

Of greatest importance, however, libraries should investigate how they can most reasonably and effectively be engaged in the process of literature procurement in the changing technical conditions. The plans of several data bank retailers to deliver copies of the entire literature on a specific topic or problem cited in their data banks to the customer without exception and without the customer's examination, must necessarily lead to the production of extravagant quantities of printed paper -- which no one really needs.

All experiences with information data banks in the last years have shown that at most half of the literature cited for a specific problem is truly of interest to the client. That is not only determined by the broad pattern of the input and by a certain summarical retrieval technique, but also by psychological factors of the users of data banks. Every model for the coordination of data bank retailers and institutions for the provision of literature must therefore proceed from the fact that the customer himself makes the selection from the titles prepared by the data bank. Automated evaluation procedures have hardly proved useful in this area. This selection procedure is naturally best connected with the informational procedure, as is already the case at Lockheed. The problems of this coordination between data banks and libraries, however, begin only after this selection process has taken place.

The solution currently being strived for in connection with the so-called "parking files" which can be retrieved by libraries, still needs the functional organization so that in every case, the library which can supply the client with the desired literature in the most uncomplicated and quickest way possible will already be contacted in the first step. Here, not only the collections of literature at the various libraries play an important role, but also certain geographical considerations. A client living in Rome certainly has more rapid access to

a library in that city than for instance to the British Library Lending Division in Boston Spa.

I don't want to make any proposals of my own. However, I believe that the Section on Interlending of the IFLA should give this problem most urgent priority in the next years, namely, how libraries can best fulfill their functions of provision of literature within the modern information networks.

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269-RE

CHINESE LIBRARY NETWORKS: Retrosprect and Prospect

by

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CHINESE LIBRARY NETWORKS: RETROSPECT AND PROSPECT

By Xu Wenxu
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In the People's Republic of China the establishment of library networks is presently underway. In the later 1950s, there already appeared regional or professional library networks on different scales. According to the "National Books Coordination Program" ratified by the 57th Plenary Session of State Council on September 6, 1957, a "Books Group" was set up to assume the role of coordinating and projects making. Led by the State Scientific and Technological Commission, the "Books Group" was formed by representatives of the Ministry of Culture, the Ministry of Higher Education, the Academia Sinica, the Ministry of Public Health, the Ministry of Geology, the National Library of Peking (renamed National Library of China in 1981), as well as some experts of library science. Later on, two National Central Libraries Committees were established, one in Peking, the other in Shanghai. Then there established nine Central Libraries Committees on regional level in the cities of Wuhan, Shenyang, Nanjing, Guangzhou, Chengdu, Xian, Lanzhou, Tianjin, and Harbin. Each of these Committees is composed of those local libraries having most substantial collections and well founded vocational service. For instance, the National Central Libraries Committee No.1 is composed of the National Library of Peking, Library of the Academia Sinica, National Geological Library of the Ministry of Geology, Library of Medical Science, Library of Agricultural Science, Library of Peking University of Agriculture, Library of the China People's University, the Qinghua University Library, Library of Peking Normal University, etc.

The task of the Central Libraries Committee is fourfold:

1. To assist the organizing and managerial setups, as well as leading departments of scientific research in their overall planning of library service;

2. To study and dissolve problems regarding the division of labour and cooperation among central libraries in the realm of acquisition, coordination, exchange and inter-library loans, etc.;

3. To study and dissolve problems of centralized catalɔguing, the copmiling of union catalogues, the reporting on newly published books, and also to make plans and devise for their realization;

4. To study the problem of raising the vocational level of library staff and also the problem of initiating and promoting spare-time education.

Right after these Central Libraries Committees were formed, they started to work on the following items: coordinated book and periodical acquisition on a regional or national level, the centralized cataloguing, the allocation and exchange of duplicates, the compiling and publishing of union catalogues, and reporting on new publications through bulletins, and also the training of staff by groups at set periods of time, etc. These items showed already the characteristics of library networks, and laid foundation either vocationally or organizationally for national networks, and could be regarded as library networking of an early stage.

In the eight years after the extablishment of Central Libraries Committees, or in 1958-1965, library service in China had undergone a marked development. According to statistics taken in 1964, the aforementioned 11 Central Libraries Committees embodied 105 libraries of various departments and lines of profession, with a collection total of over 70,000,000 volumes. These Committees had undertaken the following work: issuing inter-library reader cards; holding exhibitions of new books or of publications and documentations on specialized

topics: founding of centres of catalogue cards, whereby the Central Libraries Committee No.1 had accumulated over 950,000 catalogue cards in various languages. Besides, as a result of coordination in acquisition, the number of copies purchased for a same book had gone down steadily, whileas the variety of book titles gained an increase, thus full use was made of the country's limited foreign currency. During this period, over 300 union catalogues, on regional or national level, had been published. Nevertheless, due to the "Cultural Revolution", the whole field of library service in China had suffered serious damage. The library networking in its early stage had unavoidably been paralysed.

As from 1976, library service in China entered a period of recovery and progress. Statistical taken in 1980 showed that the number of public libraries above county level (inclusive of county libraries) already amounted to 1,730, a number excelled the 1965 number 1,100 by 54.5%. The central libraries revived one by one. Some regional Committees, being not yet reestablished, resummed work under the temporary form of cooperative committees or cooperative groups. The core library of the Central Libraries Committee No.1, the National Library of Peking, had with rapid strides resummed its international exchange, inter-library loans, photo-duplication service, and training of staff, etc. Its reference information service had also recovered, and in addition had developed inter-library cooperation of reference work on a certain degree. The Section of National Union Catalogue and the several Sections of Centralized Cataloguing, which were attached to the National Library of Peking had also gathered staff and resummed work.

The Library Coordination Group in the locality of Peking was founded in September 1977, having as its members 18 libraries belonging to the three lines: the public libraries,

the university or college libraries, and research libraries. The task of this Group is the study and dissove through consultation the problems of coordination among libraries in Peking. In 1980, the Academia Sinica established a "Publishing, Books, and Information Committee" to enhance the function of leadership in these fields. In 1981, the Ministry of Higher Education founded its "University and College Library Service Committee". Comprised of representatives from 50 institutes of higher education, this Committee functions as a leading organization guiding the work of university and college libraries all over this country. One of its responsibilities is the organizing of coordination among its member libraries. With regard to the basic organizing work necessary for establishing national networks of libraries, it is noteworthy that the Secretariate of the Central Committee of the Chinese Communist Party had made a decision on May 26, 1980 at its 23rd Session that an Administrative Bureau of Library Affairs be set up under the Ministry of Culture. With the setting up of this Bureau, all public libraries now subject to a central leadership and find it also quite a facility in negotiation for coordination with libraries along other lines.

Since one of the fundamental technical prerequisites for organizing library networks is the standardization of various branches of technical work, a "Technical Committee of National Standardization" was set up in November 1977, corresponding to ISO/TC46 and ISO/TC171. In the three years following its setting up, this Committee did active organizing work in exploring the problem of standardization of documentation, a problem including micro techniques, transliteration, technical terms of different subject fields, automation, cataloguing rules, thesaurus and indexing, the entries in compiling catalogues, the format of publications, and equipments needed,etc. In October 1981, the National Standard Bureau forwarded the "summary of National Standardization Meeting on Cataloguing Rules and Subject Retrieval Systems", and showed agreement with the recommendation by this Meeting of two tool books,

"Classification - A System in Use in Chinese Libraries" and "Chinese Thesaurus", serving as a basis, to be adopted gradually for trial use in appointed institutions in China, for the purpose of improvement through practical application. It is intended that these two tool books might thus in the future be recommended as national standards.

Regarding the recommended "Classification - A System in Use in Chinese Libraries", this is a book compiled through years of combined efforts by staff members of libraries as well as scientific information institutes, having on its editorial board such staff members from a total of 36 institutions. The editors absorbed the good experience of other classification rules, home or abroad, in combination with practical utility of this country. The first edition of this book appeared in 1975, then a revised edition appeared in 1980. This book is divided into 5 fundamental parts: Marxism, Leninism, Mao Zedong Thought; philosophy; social sciences; natural sciences; generalities. These 5 parts are divided into 22 first class categories which are further broken down into more than 25,000 subdivisions. The symbols of this book is composed of Chinese Phonetic Alphabet accompanied with Arabic numerals. This book of classification system, together with another tool book "Chinese Cataloguing Rules for Books and Documentations" which has been compiled along the same system and had its total number of subdivision amounted to 40,000, form a set of China's own comprehensive classification rules which facilitates the classification of books and documentations as well. They are presently being adopted in use by 90% of the libraries and information institutes in China. It is hoped that these two books, as a foundation, through revising from time to time, stressing its common points with other classification rules, might finally be received as national standards, and also might facilitate their cross reference with other classification rules, home and abroad (for instance, the "Classification Rules of Library of Academia Sinica", as well as the four classification rules recommended by IFLA: UDC and others).

As a component part of information processing of Chinese characters, "Chinese Thesaurus" was published in 1981. Its compilation took 3 years, with 1,500 institutions taking part in. The "Chinese Thesaurus" comprises a total of 90,000 descriptors, and 17,000 non-using descriptors. There are 58 categories in its index (15 in social sciences and 43 in natural sciences). The publishing of "Chinese Thesaurus" has created the prerequisite for initiating automatic retrieval of information and documentations, and for the building of a nationwide network for on-line retrieval as well.

The organizing and building of a nationwide network is a matter of common concern to China's reading public as well as to workers of libraries and information institutes. The 4 modernizations of China needs a multi-functioned library network, which should be flexible in adaptability and good in centralized coordination. It is maintained here that for laying fundation of network, the first step is to develop libraries of different types. The libraries in China fall roughly into 5 systems: public libraries, scientifi research libraries (including that belonged to government institutions), university and college libraries, labour union libraries, and armed forces libraries. Each of these systems now has a considerable number of libraries which are promoting their reader's service while making continual progress in strengthening themselves. Such is the basis of networks.With the continual enlargement of the scope of organization within each of the aforementioned systems, as well as among these systems, a closely interwoven nationwide library network will finally be set up, making all the library activities of the whole country coordinated like the moves in a game of chess.

In the formation of a nationwide library network, we are of the opinion that public libraries are to serve as the backbone, while county libraries are to serve as ending points of the net.Statistics made in 1980 reported 2,100 county governments, with 1,300 county libraries. That means

62% of county governments have had libraries built. Thus, the short-term target in the formation of nationwide network is to strive for having a library in every county. When building the library networks, due attention should be paid to keep it in pace with the development of information networks (for social sciences and natural sciences). A number of documentation retrieval centres and data bases should be built in the shortest time possible, thus forming a nationwide publications, documentations, and computers network. Modernized means should be adopted in order to render more effective the national and international resources sharing.

Looking into the future, we are fully confident in establishing a nationwide network. By summing up our experience and lessons in building networks, as well as taking into consideration of the gains and losses in the building of library networks abroad, we intend to explore and find a path suited to our own circumstances, and to make an overall plan and all-round arrangement.

Our social system is based on public ownership, which is a condition of great advantage in building up library networks. However, without doubt, with the present rate of increase in production of our national economy, it is not yet possible to supply enough machinery for use in libraries. Even if the nationwide network is to be built up in the future, the feasibility of mechanized operation will still be considered with a view to financial results and energy consumption.

The above is a rough outline of retrospect and prospect of library networks in China.

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LIBRARIES OF THE FUTURE : ELECTRONIC NETWORKS AND HUMAN CONCERNS

by

Edward CORNISH (WORLD FUTURE SOCIETY, Bethesda, USA)

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Libraries of the Future:

Electronic Networks and Human Concerns

by Edward Cornish

address to the 48th General Conference of the International Federation of Library Associations and Institutions, Montreal, August 27, 1982

Libraries constitute the memory of our civilization. They are the ultimate repositories of our most important experiences as human beings. Much of what we experience in life goes unrecorded, but when something seems important, we may make a note of it and the little notes that we make may eventually become distilled into the books that are preserved for the future in libraries.

The importance of libraries is often neglected because they seem remote from the world of action, from the so called "real" world. Politicians do not go to libraries to hold their press conferences, nor do military commanders consider them prize strategic targets. On the surface, the life of a library seems unusually quiet and dull; the library is the place where nothing much seems to happen from day-to-day, and so newspapers and television stations rarely find much to report that's exciting about libraries.

But let us not be deceived by the quietness and seeming isolation of libraries. The world's great doers as well its great thinkers constantly depend on libraries to provide the vitally needed intellectual resources required by modern business and government. Multinational corporations and government agencies now maintain major specialized libraries, generally at their headquarters sites, and could hardly function without constant reference to their libraries and the various materials that the libraries circulate among the staffs of executives, scientists, technicians, and others. The US congress maintains the Library of Congress, now probably the largest library in the world. Through its Congressional Research Service the Library supplies the legislators with the vast amounts of information now required to write laws, hold hearings, and make speeches. People who think of libraries as being dull places

might well remember that another great library, the British Museum, provided Karl Marx, one of its most faithful patrons, with the materials for his famous book Das Kapital. And years later a follower, Vladimir Lenin, made plans for the Russian revolution in the quiet libraries of Switzerland. One wonders if the librarians who watch over these revolutionaries ever had to hush them. If so, they at least had the courtesy to go elswhere to make their biggest disturbances!

The memory function of libraries is vitally significant to civilization. Thanks to libraries, we do not have to make the same mistake over and over again. We may make it over again, but we aren't compelled to; because we can learn from somebody elses's experience. We do not have to keep reinventing the wheel, but instead can build a wheel based on what we find out in the library and then go on and invent something else. We do not have to rediscover Newton's laws or Darwin's theory of evolution; they are all waiting for us in the library whenever we are curious. Nor are we limited to the poetry and novels that are being produced today; in the library we can find the poems of Homer, Shakespeare and Goethe; as well as the novels of Victor Hugo, Tolstoy, and Steinbeck. In short, libraries enable us to draw on the important experiences of other people living in many different periods of history. Thanks to libraries, we can stand on the shoulders of giants and do things that even they could not accomplish.

Despite the remarkable achievements in libraries and their vital role in human life, libraries today face enormous challenges that may threaten their present role in human life and their current modes of operating. In my remarks today, I should like to suggest what some of these challenges are and offer a few suggestions about what might be done to meet them. I must caution you that I have no special knowledge of libraries (except as a frequent patron) and must speak as a futurist. So perhaps I should begin by saying a little about what a futurist is--and isn't.

Most people tend to think of a futurist as being a seer or predictor of future events. But futurists are not seers and they do not believe that the future is

predictable--at least not in the aspects that are the most important to us human beings--because human beings do not have a fixed future, but rather a future that they themselves are constantly in the act of changing. When we futurists think about human beings we must be rash indeed to try to predict their future. Rather, we try to think of things that might happen in their future, partly to help them decide for themselves what things they want to make happen. In other words, we try to help people choose for themselves the future that they want to have. Having minds of their own, human beings decide their own futures, at least to a very large extent. And that's what makes their future unpredictable--but a lot more interesting then it would be otherwise.

Though futurists are not in the business of predicting what human beings are going to do in the future, the notion persists that that is our task--and that we fail miserably at it. People are always digging up some prediction made at some point in the past that seems silly in the light of what has happened since. This has led to a lot of wisecracks. I for one am getting a little tired of hearing a futurist defined as some one who doesn't know what happened yesterday, doesn't understand what is happening today but will tell you all about what will happen tomorrow--provided he is leaving town tonight.

The role of futurists is, in short, to help people think about the future so they can have a better future. One approach to doing this is to identify current trends and try to suggest where these trends may lead us if they continue. Please note that this is quite different from making a prediction. When futurists suggest the possibility of a war or and economic slump or something else unpleasant, it is not with a view to making such an event come about or to say that it is inevitable; rather, we hope to give people an opportunity to prevent the undesirable event from happening--or at least to make adjustments that will make the event easier to bear if it must indeed come. One last point I should make about futurists: We are generalists rather than specialists. Instead of learning more and more about less and less as the specialists do, we generalists find ourselves knowing less and less

about more and more. Eventually, if we keep at it, we may find ourselves knowing nothing at all--but it will be about everything!

In attempting to anticipate some of the possible developments in the future, futurists typically try to identify significant trends and then project them into the future. For example, on the basis of the current rate of increase in the world's population, currently about 4½ billion, we may have about 6 billion on the earth in the year 2000. If so, the world faces the problem of how it is to feed, clothe, and employ all these extra people. Another well-established trend is the steady advance in medical knowledge, which enables physicians and hospitals to cure many people who would probably have died a few years earlier. Today there is speculation among futurists that scientists may one day discover the secrets of the process by which people age. It is interesting to note that despite the enormous improvement in medical knowledge and the ability of the physcian to perform seeming miracles, all of the advances seem to hve done no more than enable human beings to live out their "normal" life-span of about 80 or 90 years. Physcians cannot take a 90-year-old person and give him 20 more years of life. The time clock that ticks away inexorably in each human being cannot, at present, be stopped but someday it may be possible to stop our biological clocks and enjoy a lifetime of 200, 300 or even more years. Possibly this would enable librarians to catch up on their cataloging.

Another important trend, and one that is likely to be extremely important to libraries during the next few years, is the deterioration of the world economy. The world economy boomed during the 1950s and 1960s but became sluggish during the 1970s and shows signs of faltering seriously in the 1980s. If the world economy continues sluggish during the 1980s, libraries must face continuing austerity. And this is likely to mean that librarians may need to work harder to control costs and at the same time develop new markets and greater support for the

invaluable services that they provide to their communities. I think that this can be done effectively, thanks in large measure to another important trend--the rapid development of electronic technology.

Down through history, people have complained about new technological developments. And perhaps at no time have we had so much reason to complain as today when we have so much new technology to complain about. Technology is upsetting our lives more than ever, but a glance backward at history may help give us some perspective: In ancient times, when books were extremely rare and largely unavailable to the ordinary person, higher learning was based largely on oral materials, often poetry, since poetry is easier to memorize than prose and provides generally, a greater psychological reward. The ancient Greeks, for example, based their education, in very large part, on the epics of Homer. When writing appeared, many highly learned teachers scorned the new-fangled technology. The philospher Socrates thought that books would cause people to lose their memories. For this reason, he wrote nothing, and today we know of Socrates only because Plato, Xenophon, and others did not share Socrates' distrust of writing.

Despite Socrates' objections, writing and books came to be accepted, and libraries developed to contain the products of the new technology. Initially a book consisted of a long roll of paper, made of papyrus or animal skin, rolled around two sticks. It took centuries before the codex, consisting of pieces of paper cut into what we now call pages and fastened at one side, became common. The codex, people eventually decided, was easier to handle and eventually became the standard book form. Since the development of codex, there have been few if any really significant changes in the form of a book. A codex produced many centuries ago could sit on a shelf in one of today's libraries and be handled much like any other book in the library. It might be treated with special care because of its great age and value, yet it would stand up better to wear and tear than today's books, which often are printed on woeful paper which disintegrates rapidly due to acids in the paper.

The invention of movable type by Johan Gutenberg was, of course, an enormous step forward in book production. Later came presses of increasing speed and sophistication, as well as automatic typesetting. All of these advances made it possible to produce more books faster and cheaper but they did not alter the basic form of the book, and today, as a thousand years ago, the book remains the means whereby knowledge is transmitted from generation to generation and across thousands of miles. Universities, government agencies, businesses, and ordinary people rely on the book as their main tool for reaching beyond the ephemeral documents--newspaper reports, letters, television documentaries, and so on.

But in the years ahead, the book may face a major challenge from some of the new electronic systems which offer important advantages over the book for many purposes. Such a development suggests a growing identity crisis for libraries: Are libraries in the book business or, more broadly, the printed matter business? Or are they in information business? Libraries must decide whether they will accept a growing number of information products that are non-book in character--such as videodisks and computer disks--or whether they will let other agencies of society take on these new information products. For some perspective on this dilemma, let's imagine a clay tablet maker in a region of ancient Babylonia When paper was developed--the paper being made of sheep shin or papyrus--the clay tablet maker had to decide whether he would switch to making other clay products (because he was really in the clay business) or whether he would start selling and manufacturing the new paper products, because he was really in the information business.

If you were a librarian in ancient Sumer and used to dealing with clay tablets, you probably wouldn't like materials on paper. Doubtless you could find many objections: the paper scrolls don't stack as neatly as the clay tablets. You know where everything is in your clay tablet library and you've got no place to put these pesky scrolls. Your patrons are used to clay tablets and

a lot of them don't want to switch any more than you do. The scrolls are awfully expensive: you can get a room full of clay tablets for the price of one scroll. And since the scrolls are expensive, you will have a new security problem.

Keeping in mind the very painful transition that a Sumerian librarian might have had in moving from tablets to scrolls, we can perhaps appreciate that today's librarians will have some traumas moving from books in their present form to something radically different like videodisks or computer diskettes. But it now seems clear that increasing amounts of information in our society are likely to be stored in forms that are quite different from that of the standard book. During the 1980s, I believe, two very remarkable technologies are likely to come into their own. One is the video technology represented by videotapes and videodisks, and the other is the personal computer technology which promises to make the enormous information storage and retrieval capabilities of computers available to ordinary people in their homes and places of business.

Let me emphasize that these are not brand new developments in electronics but they are at the stage that television was about 1950. Television was scientifically demonstrated back in the 1920s but did not enter U.S. homes until after World War II. The 1950s started with only a small minority of U.S. homes having television, but by 1960--only ten years later--the majority of homes had television and television had become--for better or worse--one of the most important elements in American life.

During the 1980s, I believe, we are going to see a similar spread in the new video and computer technologies. By 1990, I believe, a majority of American homes will have either a video taperecorder or a videodisk player. In addition a majority will have either a computer or a computer terminal. These new technologies may change our ways of living and working as much as television has and perhaps a good deal more. Video and computer technology can do a lot of jobs better then books can. As a book lover I hate to admit this, but I am afraid it is simply a

fact, and we ignore facts at our peril. So rather than just hope these new technologies will go away, we need to reach out and take advantage of them. I believe that librarians should make a conscious effort to familarize themselves with the new technologies and look on them as potential friends rather then sworn enemies. I suggest that you try to make friends with a videotape recorder, cozy up to a videodisk player, take a computer to lunch! Perhaps someday you will say that some of your best books are electronic.

Do these electronic products mean that the book is really done for? Will books become simply museum objects like the ancient clay tablets of Sumer? I don't believe so. I think it is even possible that more books will be published in the next 20 years then were published in the past 20. For one thing, more people may be reading books around the world, because the electronic systems can--I do not say, will--help upgrade the world's educational level. It is also possible that librarians and others in the book business can use the new electronic technologies to increase the demand for books.

And that brings us to the general question of how libraries will adapt in the years ahead? First of all, let's remember that the book in its present form has been around for centuries, and in recent years more titles and more books have been published then ever before. There are good reasons for the book's popularity. For one thing, books are extraordinarily cheap. Many older books can be picked up for a trifling amount of money and if you're going to attempt to get a similar amount of information from some other source you would likely pay a good deal more. A second point is that the information contained in a book can be carried with you wherever you go. You can take it to your home or to the beach and you can use it under a wide variety of circumstances. If you wake up in the middle of the night, a book responds instantly to you as soon as you take it off the shelf. In a very short period of time, you can look over dozens of books, choose the one that you would be most interesting to you, and immediately turn to the sections that you want. In comparison, it is very difficult to obtain from a television set the sort of information you are seeking. Videotapes and videodisks offer a step forward, but as of today they are more expensive

and far less available then books. A third point about books is that the technology for producing them in large quanity is now widely available in our society. Thanks to instant printing techniques and xerography, it is possible for almost anyone to assemble a book with materials available in most offices or even in many homes. A fourth point is that scholars and scientists today are heavily committed to using information published in book form. It is not going to be easy to get them to accept non-book information except as supplementary to information in book form. Lastly, the book is probably a more usable information source for many purposes then the existing electronic equivalent. Of course, this situation may change drastically within a decade or so. However, for the moment, it is far easier and more satisfactory to get most information in book form from your local library than to try to get it from a computer. There are plenty of bugs that haven't been worked out of these electronic systems.

The book still has an essential role in our society, but we must anticipate over the next few years that video and computer materials are going to make their appearance in libraries and we must expect that they will gradually assume considerable importance. A sign of this trend is already apparent in the proliferation of videotape clubs, which enable people who have small personal libraries of videotapes to exchange them with other, often with assistance from a commerical firm. As videotapes become increasingly common--and less expensive--libraries will find it natural to add them to their collections. The videodisk technology, which is still struggling to make it in the consumer market, may prove even more important to libraries than videotapes. Videodisks appear to be inherently cheaper, and this cost advantage suggests that videodisks will tend to displace videotapes except in those applications where videotape clearly performs better. As of now, videotapes can be used to capture over-the-air television broadcasts, and since videodisk players do not now have this capability, videotape recorders are more popular than videodisks. But that may change within a few years.

In addition to a growing number of videotapes and videodisks on their shelves, libraries will also aquire growing stocks of computer software. As computers spread through society, and more and more people find uses for their computers, there will naturally be a growing demand for the software essential to making the computers perform desired functions. So libraries may be expected to begin acquiring diskettes and other material for home and small business computers. Much of the software provides information that would be perfectly acceptable to librarians if it were in book form; for example, many computer programs can be used to instruct students in foreign languages; English composition; biology, chemistry, and other sciences; and an endless array of other topics.

Today the computer is viewed as a highly complex and hard-to-use mechanical system. As it becomes more sopisticated mechanically, it is likely to become simpler for the human begins who are using it. Eventually, we can anticipate that computers will become as familiar and acceptable to ordinary people as telephones. People today ordinarily have little or no interest in the insides of the telephone instrument they are using, much less in the highly complex electronic system which the telephone instrument provides access to. The important thing for the telephone user is simply that the telephone do its job. The technical matters can be ignored.

In addition to videodisks, videotapes, and computer diskettes, libraries have the option of acquiring collections of video games Some games have a heavy educational content. For example, there is a game called Speak 'N Spell, which teaches children how to spell about 200 words. Libraries could develop collections of such educational games, which could greatly increase the number of people who would make use of the library's facilities. In North America, video games have achieved wide popularity among young people. The games now are used primarily in people's homes and in commercial arcades. If deemed suitable for libraries, video games might bring in many young people who later might shift their interest to

other video materials, computer software, and even--who knows?--books.

Libraries could become the primary institution for teaching people to use the new video and computer systems which have enormous possibilities for expanding the scope of adult education. A videotape or videodisk can provide excellent instruction in almost any subject a person wishes to learn. Already, video systems are available to teach people how to play golf and other games; perform home repairs; and so on. It is easy to visualize a highly effective course in a foreign language using native speakers in their native settings to provide learners with a real sense of being in a foreign culture and listening to natives speaking their language in their own way. Similarly, a computerized mathematics program can patiently lead a student who has difficulty with mathematics over all the steps again and again until he finally understands the subject thoroughly. It is ironic that many students say that computers are "more human" than their human teachers. Unlike flesh and blood teachers, computers do not punish a child with ridicule before his parents and classmates. The student is free to learn at his own pace and to repeat lessons again and again without feeling foolish.

Thus if libraries decide that their business is information rather then simply books, they have a golden opportunity to reach out and appropriate these exciting new technologies which promise so much for our society. If people can turn to libraries for the exciting products that the electronic technologies make possible, then libraries are likely to grow vigorously in the years ahead; on the other hand, if libraries see their business as exclusively books and printed materials, they are likely to find that their growth will be relatively static because many of their potential patrons will be turning elsewhere for their information needs.

Even if libraries stick to books and other print materials, they will use the new electronic technologies in a very wide variety of ways.

Already, many libraries have turned to computers for their record-keeping. Automated systems now perform a great deal of the essential tasks involved in cataloging and shelving books and maintaining records on patrons and their borrowing and return of books. Computers are also being used to link up libraries into evergrowing networks so that resources can be shared among a wide number of potential users. In effect, the new technology--computers--is becoming an important servant of the older technology--the book. Use of electronic systems can reduce labor costs and also the cost of books by making the same available to larger number of users. Computers also make it possible to charge people more easily for birary services. There is much to be said for libraries charging for their services so that they can develop a more new services. With computers handling much of the recordkeeping and libraries being able to tap automatically into a user's bank acount or credit system, libraries could charge users modest amounts for services rendered and most users would not object to nodest charges once they got used to them. These charges would make it possible for libraries to acquire a lot of items that today would be prohibitively expensive, granted the limited financial resources that most libraries have.

Now let's try to imagine a typical library in the year 2002. This particular library we will imagine to be in the suburbs of a large North American city like Montreal.

Since no library can hold more than a fraction of the available titles, the imaginary library we are visiting has had to be highly selective. Most of its books are in either English or French because its resident community is largely bilingual in those languages.

As with other libraries; our imaginary library has acquired books to meet the special interests of its community. In this case, those interests include: Canadian subjects, international business, mining, and timber.

People who come to this library in the year 2002 are identified by a computer-based optical scanning system, so it is known who visits the library. This information is valuable not only for keeping track of people who may owe money to the library system, but also provides valuable statistical data, on such things as when people come to the library and on what days, etc.

Many people objected at first to being electronically scanned whenever they entered or left the library, but they eventually accepted it because it meant that the system effectively screened out undesirables and prevented the thefts that had plagued the library before. With the new electronic security system, the library has become a very safe place and books are very rarely stolen.

The electronic system also make it easy to get books back onto the right shelves. Much sorting is now done by robots that can read information on a book and put it automatically on the right shelf by means of a robot book-shelving system. At present, the library does not have the newest robot system that actually puts a book in its proper location on a shelf but it is already talking about acquiring one as soon as the funds can be found.

The electronic system allows books to be sold to any patron who happens to want to keep a particular book. Not all books are for sale because some are out-of-print. Whenever a patron wants a book, the library staff simply charges the patron's account. The transaction is now simple and routine. As soon as a book has been sold, the library immediately orders a replacement copy unless the title has been marked for discontinuance.

When libraries began selling books, many booksellers objected, but publishers strongly backed the concept, as did authors and book manufacturers. The book sellers gradually gave way when they realized, first, that they were getting orders

for replacement books from libraries and also that the new system was encouraging people to have libraries of their own, and thus to buy more books from book sellers.

Books now are cheaper in real terms than they were in the early 1980s, because a wide variety of automated systems have reduced the cost of typesetting, printing, binding, and distributing books.

A book that cost $20 in 1982 can be bought for about $5--75% less--in the year 2002. This reduction in the real cost of acquisitions has made it possible for the library to expand into a lot of other types of acquisitons, such as videodisks and computer diskettes.

Why have book prices come down so much in real terms? First of all, authors now routinely prepare their manuscripts on word-processors, so that corrections can easily and quickly be made and a manuscript can be typeset automatically by means of a computerized typesetting system. This system has drastically cut the typesetting costs that made it very costly in the early 1980s to publish books for only a small number of readers. In the year 2002, a book can be produced at only modest cost in an edition as small as 200 copies.

Book production costs have also come down because of the heavy use of automation and robots in book production. Highly sophisticated presses now operate almost automatically, churning out one book after another, with hardly a moment's pause between runs. Robots handle most of the work of binding that formerly required highly expensive human labor. Computers carefully monitor the quality of the production processes and generally can make adjustments automatically to insure there is no interruption in production. The computers also maintain careful inventory control and watch over the shipping and warehousing of the books.

The high degree of automation in the production of books has greatly reduced the time required to get a book from the author's head into the reader's hands. In 1982, it generally took a mininimum of several years. In the year 2002, this time

has been cut to about three months--and can be reduced further in exceptional instances. Most of the time required for book production now is the review of the manuscript and proofs by various authorities. The actual typesetting and printing of the book takes only a few hours.

The speed with which books are now produced has made them extremely relevant to more people. Information and commentary on new developments is quickly put into book form, and therefore the reading of books is no longer regarded as leisure-time activity unrelated to one's ordinary pursuits. Books now contain highly current information. In many instances, books are produced incredibly fast. In one celebrated instance, in the year 2001, the commander-in-chief of an invading army received a book containing a complete account of his invasion, with all the information available up to one week before he received the book. The book offered five alternative strategies for winning the campaign--strategies developed by five experts whose views were collected by a computer in the book editor's offices.

The commander-in-chief decided one of the strategies was highly promising and decided to adopt it. The strategy worked, and the commander-in-chief magnanimously credited his victory to his local librarian who had alerted the general's staff to the planned publication of the book so that it could be ordered in advance and instantly flown to the battlefield.

The librarian later received a medal from the victorious Army's High Command. This may be one of the few recorded instances in which a library patron has shown proper gratitude for the services of a librarian! And I should add that the victorious general did not forget to dictate his memoirs of the battle while it was still in progress. Even before the battle was over he had the first proofs in his hand, and a week after the fighting the general's book was on the bestseller list.

Our library of 2002 has an incredible amount of video and computer material on its shelves even though books remain its dominant feature. It may be worth noting that the addition of computer software made it essential for the library to adopt its electronic scanning system for patrons. A computer diskette

could so easily be slipped into a patron's pocket and disappear out the door. Libraries offering software had to tighten up on security and the required measures soon became generally accepted.

Library patrons interested in any subject now routinely review the offerings available on video and computer tape as well as those in book form. The plays of Shakespeare, for example, are available in a variety of video formats produced by half a dozen theatrical companies. Also available are computer programs that will test students on their understanding of a Shakespearean play; students studying Hamlet, for example, can borrow a program that will test them thoroughly on all aspects of the play. The program can also give them a grade, and they can continue to study the play until the computer program gives them a grade high enough to satisfy their level of aspiration. Students who are not interested in obtaining some kind of academic credential may take the computer program just to test themselves; others may use the program under supervision to obtain course credit.

Computer programs in the year 2002 are popular because they now can do all kinds of things undreamt of in 1982. One popular program is called MY DIARY. The computer asks a series of easy questions about how an individual spent his day, with a final question calling for any additional material that might be worth recording. People using this program can acquire, for modest cost, a printed book containing a report on their activities for an extended period, typically, one year. New individuals find it easy to maintain extensive diaries, and frequently have several copies of each edition of their diary printed for their relatives and other interested parties. The computer program, incidentally, has a TOP SECRET feature which allows users to segregate any information that they do not wish printed out, and keep it separately for their own personal use.

Most library patrons buy a MY DIARY program and keep it at home, but they come to the library to try out all kinds of other programs--programs for learning

various subjects, or performing chores like doing their taxes or analyzing their household budgets. To enable patrons to sample computer programs they may want to borrow, the library of 2002 has a large number of personal computers similar to those that people have at home. Library patrons take home only those that they really want to use.

Our library of the year 2002 naturally belongs to several library networks, which enable it to obtain materials from other institutions. Computerized communications systems make it possible to send a request instantaneously from one library to another and to query a large number of libraries about the availability of desired materials. Shipments have been speeded up enormously, so that desired books and videotapes can normally be obtained within 24 hours.

Let me summarize my remarks today by saying that books and libraries will still be an important part of human life in the year 2002, but there will be important changes--mainly for the better. Books will be more relevant to our practical everyday concerns, because they will be published faster and made more easily accessible, and they will be cheaper in real terms. Libraries will add a lot of new information products--such as videodisks and computer software--but will continue to have books as one of their principal resources.

Libraries can--and I believe should--see themselves as being in the information business rather than merely the book business. Libraries should adopt these new electronic products whenever they can do a particular job more satisfactorily, from the library user's standpoint, than can books. With this approach, libraries should enter the 21st century with strong support from their users and sponsors.

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Response to the Keynote Address

F. W. Lancaster

Graduate School of Library and

Information Science

University of Illinois

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SI°

Over the last several years I have written and spoken rather extensively on the future (perhaps "nonfuture" would be more accurate) of libraries and librarians. The scenarios I developed, culminating in the publication of a recent book (1), have received a mixed reception. At one extreme, I have been referred to as the only member of the profession capable of looking ahead more than five years. At the other, I have been accused of irresponsibility and sensationalism.

When I agreed to respond to the keynote address of this conference, I expected to be dealing with a non-controversial topic. But Mme. Cartier's thought-provoking discussion has ranged far beyond the conventional interpretation of library networks; beyond even the customary scope of "networks" in general. Indeed, it touches upon many important aspects of the impact of computer and telecommunications technologies on society.

At the same time, she warns us of the dangers in forecasting. Making predictions, she points out, may be presumptuous; there are bad prophets as well as good; and many predictions have proven to be incorrect. With all of this, one can only agree. Consciously or unconsciously, however, she raises a challenge that is difficult to ignore. Somewhat reluctantly, therefore, I feel obliged to remain controversial by repeating some of my own predictions concerning the probable impact of technology on information services in the next several years. I will use Mme. Cartier's paper as my point of departure, indicating areas of agreement as well as of disagreement. The predictions may be presumptuous. In some aspects, of course, they may be incorrect. However, I hope to be sufficiently persuasive that you will at least understand why I believe that, in the long run, I may be accepted as a good prophet rather than a bad one.

The Acceleration of Progress

Mme. Cartier is correct, of course, in pointing out that "teleprocessing" will help to "speed up the evolution of mankind." About 80 years have passed since Henry Adams (1838-1918) put forward his "law of the acceleration of progress." The same phenomenon has been emphasized more recently by Toffler, perhaps most cogently in terms of the "800th lifetime":

> ... if the last 50,000 years of man's existence were divided into lifetimes of approximately sixty-two years each, there have been about 800 such lifetimes. Of these 800, fully 650 were spent in caves.
>
> Only during the last seventy lifetimes has it been possible to communicate effectively from one lifetime to another--as writing made it possible to do. Only during the last six lifetimes did masses of men ever see a printed word. Only during the last four has it been possible to measure time with any precision. Only in the last two has anyone anywhere used an electric motor. And the overwhelming majority of all the material goods we use in daily life today have been developed within the present, the 800th, lifetime. ((2), Page 15)

Yet, this acceleration of progress seems frequently to be overlooked. At least, the rate of the acceleration is underestimated. In extent of technological and social change, the last 20 years of this century may greatly exceed the first eighty. To give one illustration close to home, it would probably be true to say that computers had had no significant impact on library services in general, even in the developed countries, a mere decade ago.

Somewhat related to the underestimation of rate of progress is what Arthur Clarke (3) has referred to as "failures of imagination"--the inability of "even

the most farsighted prophet to visualize all the effects of a really major technological development." Mme. Cartier acknowledges this when she tells us that

> ... some of the repercussions of future changes are absolutely unforeseeable and will undoubtedly surpass the predictions of the 1980's...

In my opinion, the library profession at large is guilty of great failure of imagination. The prime example is its underestimation of the profound impact that electronics will have on the publishing industry. The true electronic publication, when it eventually emerges, will be much more than an electronic analog of print on paper. It will completely change the way in which information is presented, perhaps more closely resembling what can now be seen in the electronic arcade than the printed books we are so accustomed to.

The Impact of Technology

Mme. Cartier has discussed the impact of technology on a wide range of human activities. Nevertheless, applications in some areas of profound significance to the library profession may be given too little attention. An obvious example is that of education.

Future education may be much less book-centered and much less institution-centered, with the educational process gradually devolving to the home. Rolland (4), for example, foresees the establishment of an educational "datornet" and that this electronic network could become the primary mode of instruction at all levels. Electronic forms of education could include computer-aided instruction, educational television and even robot teachers (Freeman and Mulkowsky (5)). Dunn (6) suggests that two-way interactive television could reach 80 to 90% of homes in the United States by 2000, making external degree

programs the norm. In the next 20 years, Dunn believes, about 25% of existing liberal arts colleges could disappear as a result of technological developments, changes in public expectations regarding higher education, economic factors and social changes. McHale (7) also expects that improved communications technology will bring the "open university," not tied to a particular location.

Not all writers predict that electronics will replace the human instructor. Indeed, technology could be used to make highly skilled teachers more widely available. For example, the technique of holography could allow a particular gifted instructor to be "present" simultaneously in many different classrooms, which could be thousands of miles apart (Kotler (8)).

Clarke (9), while he accepts the inevitability of "electronic tutors," believes that the teaching profession will survive the electronic revolution just as it survived the arrival of printing. We will still need schools to teach young children social skills and discipline and universities to provide physical facilities such as laboratories.

In the age of electronics, however, the entire substance and content of education may change. It is not even certain that the written word will remain the primary vehicle of human communication:

> We are witnessing the demise of the written word as our primary means of storing and communicating information. By the time my four year old son reaches adulthood, there will be hardly any compelling reason for him to be able to read, write or do arithmetic. He will have more--not less--access to the accumulated wisdom of the peoples of the globe, but the three R's will have succumbed to the influence of inexpensive, fast, reliable computers that call up information instantly in response to the spoken word. (Wagschal (10, page 243))

McHale (7) believes there will be a shift from learning what is known to the mastery of techniques--to "learning how to learn." Similar sentiments have been expressed by Joseph (11).

Our notion of what the word "literacy" means seems gradually to be changing. The case has been put most cogently in an information sheet distributed in England by the Inner London Education Authority:

> It has become something of a cliche to say that we live in an Age of Information, or that we are witnessing an Information Explosion. However, although the terminology has entered easily into our language many of our institutions (including schools) have yet to respond to the challenges that such an age confronts us with. The ability to locate, retrieve, select, organize, evaluate and communicate information will increasingly become a major component of what we understand the term 'literacy' to mean; consequently such abilities will be crucial to each individual's quality of life. New developments in information and communication technologies are rapidly expanding our 'information environments', and also the range of skills required to exploit them; however, many pupils are still leaving school unable to manipulate even our most basic and traditional information sources.

The real significance of all of this for the library profession is that it strongly suggests that the pursuit and processing of information will become increasingly important throughout all segments of society. An "information skilled populace" will be needed to implement and exploit new technologies applied in all aspects of human endeavor. But demands for information resources can also be expected to increase through other stimuli--the need to support "lifelong learning," to enhance use of leisure time, and to satisfy the public's

growing interest in "participation" in the broadest sense (e.g., more direct involvement in their own health care). Because the collection, processing and dissemination of information is becoming such an essential element in our lives, librarians, as skilled information providers, could gain considerably in both value and recognition. Whether or not they will respond to this challenge is quite another matter.

Electronic Publishing

The book printed on paper is so familiar that we take it completely for granted although, in terms of the complete history of human communication, it is a relative newcomer. It is taken so much for granted that we see its advantages but fail to recognize its disadvantages. The fact is that as a means of communication the book leaves much to be desired. On the plus side, it is portable (at least up to a point) and it can be randomly accessed rather easily. On the minus side, the book is difficult and expensive to update; once printed, the text is entirely static--one cannot conveniently alter or rearrange any part of it; and illustrations are also entirely static. The printed book does seem convenient for works read consecutively for pleasure--it is a perfect vehicle for the novel--but it is certainly far from ideal for publications designed primarily to transmit information, including all types of reference works and scholarly and technical journals.

The limitations of the printed book have been recognized by a few visionaries. Von Foerster (12) refers to it as the "bottleneck in man's communications channels," while de Grazia (13), discussing information systems of the future, also sees problems associated with this form:

> It is doubtful that basic library materials would be bound; the bound book is, after all, an incident of the history of the

> human mind, an instrument that should not be allowed to outlive its usefulness; it is functional in certain parts of the social intelligence system at certain times and for limited purposes; it should not be permitted for minor technical reasons to become a fetish of the communications sphere; its main advantage is that it cannot easily be torn apart, which is also its main disadvantage. (Page 40)

> More recently, Clarke (3) has claimed that
> The first great technological aid to education was the book... That miracle is about to be surpassed by an even more remarkable one, as astonishing to most of us here today as books would have been to our remote ancestors. (Page 30)

The miracle referred to, of course, is the application of the computer to education and to publishing.

The evolution from print-on-paper to electronic publication seems to be proceeding through a series of identifiable phases. In the first, computers are used to produce conventional publications printed on paper. The machine readable database, used to generate the paper product, can then be used for other purposes. We can refer to this phase as a "dual mode" phase since print on paper publications exist side by side with direct electronic equivalents. Clearly, the indexing and abstracting services have been in the dual mode phase for almost two decades. At the present time, other types of publication are moving rapidly into this phase. The full text of several newspapers, popular magazines and scholarly journals can now be accessed online; so can certain conventional reference books, including encyclopedias, directories and biographical dictionaries.

The second phase is the emergence of completely new publications that exist only in electronic form. We are already in this phase and have been for some time. The most obvious examples are various databases and databanks, accessible online, for which no printed equivalents exist. Less obvious examples include publications (e.g., training materials) available on videodisc, those distributed as cassettes for use with home computers, and the bilingual dictionaries that look rather like enlarged pocket calculators. It is noteworthy that some of these publications are distributed (as cassettes, discs, and other physical artifacts) while others are accessible (through conventional online networks or, in some cases, interactive television). An important characteristic of electronic publication is diversity, and it seems certain that yet-to-be-invented forms, as well as refinements of existing forms, will soon appear.

The third phase of the evolution is the gradual replacement of print on paper by electronics. This phase has not yet been reached, but we are certainly on the threshold of it. Signs of user migration from print on paper to electronics can now be seen (Lancaster and Goldhor (14)). Certainly, the replacement phase seems likely to affect various types of publications in the same sequence that these moved into the dual mode phase. The expensive, bulky publications, and those that need frequent updating, should be replaced first. These will include the indexing and abstracting services and many conventional "reference books." Other forms, including the scholarly journal, will be affected somewhat later.

The conversion to electronics will accelerate rapidly when the true capabilities of electronic publication are recognized and exploited. This has not yet occurred. In general, computers first change how we do things and later change what we do. In publishing, also, we can expect electronics to lead to

completely new capabilities for the presentation of information. Publications now accessible online look much the same as their print on paper equivalents. Essentially they are printed pages displayed on a screen. It seems likely, too, that the first electronic journals will also be more or less static analogs of the printed page. Later we can expect that electronic publications will free themselves from the entirely static limitations of narrative text printed on paper. In other words, the capabilities of the electronic media will have a very profound effect on the way information is presented. First, perhaps, "hypertext" types of capabilities will be used to present narrative data in a somewhat different form. For example, an electronic textbook could look much different from one printed on paper. It need not be designed to be read in one particular sequence. It may allow many alternative reading pathways or be capable of reorganization into various sequences to meet the needs of different instructors, courses, or students. At any point in such a text, a student may enter an annotation, a comment, or a question to an instructor. Instructor responses can also be incorporated and, for any portion of the text, a student could get access to the questions and comments of other students and/or the responses of several instructors. Even the bibliography for such a text does not need to be static. Indeed, the text could be interfaced with an online retrieval system in such a way that the reader can get virtually immediate access to citations representing the latest literature on any topic discussed in the text. Furthermore, the text itself can be constantly updated by means of computer conferencing among a group of subject specialists, the authors of the text. A change or addition to the text is made as the result of a consensus, among the authors, achieved through the conferencing facilities.

Many of these features already exist, at least experimentally, e.g., within the "living text" system incorporated into PLATO at the University of

Illinois, and plans have already been made to experiment with the other features mentioned. At the University of Illinois, a "living textbook" of pathology is being created and used in instructional programs. The Hepatitis Knowledge Base, developed by the National Library of Medicine, is an example of a "state of knowledge" compilation kept current through the development of group consensus achieved through computer conferencing.

Anyone who has used a sophisticated computer-aided instruction system, such as PLATO, will know that a system of this type can incorporate very effective analog models. It is possible to build an analog model of a scientific experiment, in, say, chemistry or genetics, as well as analog working models of various types of equipment. It is not difficult to realize that electronic publications need not be restricted to the static properties of the printed page. The true capabilities of electronics in publishing will be reached when completely new and dynamic publications emerge. Visualize an electronic encyclopedia that incorporates dynamic analog models of equipment and experiments. Even the tactics/strategy of historical battles could come to life on the screen. Such a presentation would closely resemble the presently available electronic games. Or think of the capabilities of future journals in scientific/technological fields. Rather than describing what happens when loads of a specific intensity are applied to a particular type of structure, a journal in applied mechanics could demonstrate these effects. Moreover, since computer programs can be incorporated into a contribution to an electronic journal, the reader could actually perform new data manipulations, varying the loads or stresses, for example, and observing the effects. Future publications will be interactive. The possibilities are limited only by the imagination.

Sound output is also possible with an electronic encyclopedia. In certain subject areas, e.g., music, poetry, ornithology, encyclopedia articles could be greatly enhanced through this feature. The Wall Street Journal has reported Kenneth Kister, author of the Encyclopedia Buying Guide, as saying that, through such new capabilities, "Encyclopedias will be released from the bondage of the printed word."

In other words, the application of the computer to publishing promises to do much more than simply displaying the printed page on a screen. As Brown (15) has stated:

> ... the revolutionary transformation of learning in our society that we see as possible for the 1980s is not simply a consequence of the incredible computer technology that will be available then. It would not revolutionize education, for example, to place the Encyclopedia Britannica within the memory banks of every home computer. While this is worthwhile, it would not be qualitatively different from placing the books themselves in the home, only cheaper.
>
> The unique quality of the computer that does make possible a revolution is that it can serve as a cognitive tool. It can be an active agent--a servant assistant, consultant or coach--in a way that books and television cannot. With vision, with planning, with dedicated research, our citizens can be employing this tool to open a new frontier of the mind within a decade. (Page 300)

One further point needs to be made. The evolution applies most clearly to publications distributed primarily to convey information rather than those intended to entertain or "inspire." It is perhaps unlikely that novels, or popular magazines of the type available at drugstores, will be read at online terminals. It is highly probable that novels, "bestsellers" and popular

magazines will last much longer in print on paper form than other types of publications. This does not necessarily mean that they will last forever. Novels, after all, are an artifact of an age of print on paper.

To reiterate, electronic publishing will develop through two stages. In the first, the electronic publication is little more than a print on paper publication presented electronically (as existing online catalogs are little more than card catalogs in electronic form). An encyclopedia designed for print on paper but accessible through a domestic television set cannot really be considered an electronic encyclopedia. Neither can an existing journal accessible online be looked upon as a true electronic journal. In this stage, the electronic version is little more than a direct analog of the printed page, offering some advantages over print on paper but also having some notable disadvantages. True electronic publications will only emerge in the second stage, one in which new publications will be designed ab initio for electronic distribution only. In this phase, the real capabilities of electronics will be exploited, and the new publications will divest themselves completely of the inherent limitations of print on paper. True electronic publications will be dynamic and multidimensional rather than static and one dimensional. Narrative description could be presented as a "hypertext," re-organizable under the control of the user. Many static illustrations will be replaced by animation or by electronic analog models, e.g., of physical phenomena, the conduct of an experiment. Supplementation of text and illustration by audio output could also occur if certain forms of electronic distribution are adopted.

Related Technologies

Parallel developments are taking place in other aspects of human communication. The widespread adoption of "word processing equipment" in industry,

instead of conventional typewriters, is leading to the "paperless office". Major corporations are beginning to use electronic mail, in place of conventional mail, for communication among the various corporate offices.

Somewhat akin to electronic mail is computer conferencing. In the former, private messages are exchanged among individuals. In the latter, group discussions take place through the electronic medium.

Another related development is that of interactive television. Traditionally, television has been a unidirectional device of mass communication. The user can choose what is viewed from a limited prescheduled menu but can neither make particular information appear on demand nor send messages through the television set. With interactive television, which is growing rapidly in Europe and Japan, as well as North America, television can be used to request and receive information on demand. The home television set can thus be used to request a specific weather forecast, to obtain the score in an ongoing sports event, or to view an airline schedule. It can also be used to view and select from a sales catalog or, for that matter, the catalog of a library, and full text can be transmitted for reading on its screen. Thus it becomes possible to request and receive selected text from books, articles, and newspapers. Moreover, what is requested and received can be "tailored" to the viewer's own requirements.

Technology and Libraries

Mme. Cartier refers to the retired librarian of the 1960's who would be "completely lost" amidst the computer technology of the academic library in 1982. This may be true. On the other hand, it may not. On the whole, libraries have so far changed remarkably little as a result of computer technology. True, we have radically changed the way we handle bibliographic

records. But the physical artifacts these records represent are treated in much the same way they were 50 years ago.

Libraries have been affected by computers and telecommunications in two ways. First, and by far the less important, has been the application of computers to internal record keeping activities: to acquisitions, receipt of serials, circulation, and cataloging. The logical end results of this application are twofold: the disappearance of paper records, including the card catalog, and the formation of networks to permit libraries to share and exchange records (cooperative cataloging, interlibrary loan, shared cataloging and circulation records, and so on). I regard this as the less important application because, while it has undoubtedly improved efficiency, reduced cost and increased cooperation, it has had no significant impact on the structure of the library or the services it provides. In library automation of this type the computer merely improves efficiency in handling records for bibliographic materials in print-on-paper form. Handling of the materials themselves is virtually unchanged. This is not a fundamental metamorphosis of the library. The effect is cosmetic and not deep-rooted. To the visitor, an automated library looks little different from the library without automation.

Much more important and far-reaching is the use of computers and telecommunications to allow libraries to access outside data bases. It is far-reaching because, besides greatly increasing a library's capabilities for literature searching and question answering, it completely changes the economics of access to information. It also completely changes all previous notions of "collections", "libraries" and "librarians".

Before computers, the only way to make an information source accessible was to buy it. When a library purchases a book or periodical, it does so for one reason and one reason only: to make it <u>accessible</u> to library users. This

accessibility is achieved through a capital investment in the physical availability of materials on library shelves. Through its acquisitions policy, a library divides the universe of bibliographic resources dichotomously: those things it adds to its collection and those it does not. In effect, the universe of bibliographic resources has been divided into two levels of accessibility: things immediately accessible and others less immediately accessible. A subscription buys only access. The cost is incurred whether or not the item is ever used. Because of the difficulties of determining need and predicting demand, many items added to large library collections are never used at all. They are in the collection as a kind of insurance; buying them is the only way of making them readily available should they be needed by a library user.

The ability to access a data base online changes all of this. A library need not make a capital investment in an electronic publication to make it accessible. It can be accessed <u>when needed</u>; the library pays only for the amount of access used at the time it is used. This has a number of important implications. First, whereas in the print-on-paper world a library can afford access only to those publications whose cost will be offset by a certain level of expected use, this is quite untrue of the electronic environment. Any electronic publication is no more or less accessible than any other. A source needed once every five years is just as accessible as one needed daily and may cost no more to use. In other words, the distinction between what a library owns (i.e., has within its four walls) and does not own is beginning to break down.

Let us carry this logically further. A library of, say, an industrial organization can now provide question answering and literature searching services from sources physically present in its own collection and from sources that can be remotely accessed. Probably the remote sources are already more

important than those physically enclosed within its four walls. What, then, is the collection of the library? Does it make any sense to say that it includes the physically present sources but excludes those remotely accessed, even though the latter are used more and are more important to the operations of the library? Of course it doesn't.

The fact is that, through the capabilities of electronic access, libraries are becoming in a sense "disembodied". This process of disembodiment will continue, at a greatly accelerated pace, as the developments I forecast earlier occur, as print-on-paper publications give way and are eventually completely replaced by electronic publications. A research "library" of the future, then, need not contain any printed materials at all. It can be a room containing a terminal and nothing more. Apart from archival repositories of the printed records of the past and institutions designed primarily to lend inspirational/ recreational reading materials, libraries as we know them are likely to disappear.

What then, will happen to the librarian? It is probably true to say that the major professional tasks performed by the librarian are: selection of materials, intellectual organization of these materials, and providing various types of literature searching and question answering services based on these materials. In the electronic world, since any information source is accessible on demand, and items are not physically "owned", the only selection activity is the selection of which source to access for any particular purpose. Likewise, because the electronic sources are not owned, they require no intellectual organization by the librarian.

The literature searching activities of many special libraries could even now be performed outside the library. The librarian could as well operate from an office or, in fact, from the home. When most of the reference tools now

used to provide answers to the questions of library users are also accessible online, the question-answering function could also pass out of the library.

In other words, librarians need no longer operate within the four walls of an institution. They can apply their professional skills in searching information sources and in answering questions wherever they can plug in a terminal. They can freelance from the home or form themselves into group practices as doctors and attorneys do. These trends, of course, are already quite evident in the profession.

The Information Gap

In my opinion, the most important message of Mme. Cartier's paper appears on the very first page. Here she emphasized the importance of eliminating "all forms of isolation in any country whatsoever" and suggests that technology gives us the means to "not only bring people closer together more easily but to also make communication instantaneous." I wish she had developed this point in more detail.

A system in which the generation and distribution of paper is very largely replaced by electronics is one that offers tremendous potential for improving both formal and informal communication processes. An electronic system also has its associated dangers. Electronic networks can serve to democratize human communication, making information more readily available, to all segments of society, than it has ever been before. On the other hand, it could have the reverse effect, promoting the establishment of "information elites". Which of these events occurs is partly dependent on how rapidly changes take place, on the type of information available, on how it can be accessed (e.g., domestic television receivers versus special purpose terminals), on pricing strategies, and on institutional attitudes (e.g., whether or not libraries consider it their

duty to subsidize access to electronic sources in the way in which they subsidize access to print on paper). In the history of technological innovation, the normal pattern of development is one in which initial elitism does occur, with the development filtering down gradually to much larger segments of the population.

It seems reasonable to expect, then, that electronic communication systems will also reach an elite long before they spread to the public at large. This, in fact, is already the case. In terms of access to publications, on the other hand, the elitist stage may be a very short one. In fact, one could argue that "conventional" access is an elitist situation and that online services are already democratizing access. In the print on paper environment, the information elite consists of those individuals affiliated with or having ready access to fine libraries (i.e., collections of physical artifacts). Thus, a physician associated with a small community hospital in, say, Tennessee, is disadvantaged in comparison with a physician affiliated with a large teaching hospital in New York City. This particular form of elitism is already being greatly reduced: through relatively inexpensive terminals, both physicians have equal access to a wide array of online information resources made available by the National Library of Medicine and various other institutions.

But there are dangers that must be recognized and guarded against. The "invisible college" structure of science already provides an elitist environment since those not well integrated into an informal communications network (because of lack of years in a field, political barriers, language barriers, or whatever) are disadvantaged, in terms of access to information, in comparison with those who are well integrated. The disadvantage, in this case, is largely one of delay in receipt of information.

Suppose that, in the electronic age, promotion, tenure and salary increases are based on considerations other than formal publication. If scholars no longer need to publish to earn "merit points", a great danger arises. It is easy to visualize the emergence of closed "invisible colleges" in specialized areas, the members communicating with each other through computer conferencing networks but feeling no need to transfer information beyond the immediate, elite circle. It would be very difficult for new researchers to break into such a group, information accessibility would deteriorate rather than improve, cross-fertilization among research areas would rapidly decline and, in the longer term, progress in all research areas would slow down, and much more duplication of research would be likely.

Another facet of elitism must be recognized. I am making the assumption that, by the turn of the century at least, satellite communication will have greatly improved the accessibility of information resources in the developing world. Several colleagues in developing countries have expressed their concern that the electronic publication/distribution of information products will put them at a great disadvantage. This would certainly be true today. Not only would there be economic barriers; there would also be technological (telephone and even electric power systems inadequate to support communications networks) and cultural barriers. On the other hand, the developing countries are already in an "information disadvantaged" position. Fine libraries rarely exist, publications are expensive and increasing in price, and currency exchange regulations restrict importation of needed publications into many countries. Moreover, even when publications are imported, they are available in such small numbers as to be virtually inaccessible to large numbers of researchers. This situation is unlikely to improve significantly as long as publications continue to be distributed as print on paper.

In point of fact, improvements are more likely to come through electronic networks. For reasons of national prestige alone, governments of developing nations may be more likely to spend money on electronic communication than they would on building up conventional library services. Moreover, the establishment of communications networks would be an obvious and highly visible manifestation of "technology transfer" from the developed to the developing world. It is probable, then, that foreign aid programs will support the establishment of networks in the developing world that are similar, in scope and purpose, to EURONET.

Work is already underway to give the developing countries electronic access to the data bases of the developed world. To quote a major example, PADIS (the Pan African Documentation and Information System), already being implemented under United Nations auspices, includes a component, PADIS/NET, designed to make data bases accessible to the African countries through a sophisticated telecommunications network.

Education for Librarianship

Mme. Cartier is absolutely correct in warning us that our library schools need to "radically alter their curricula". She is also correct in her claim that these schools "instead of anticipating new developments...have mainly adapted themselves by fits and starts to changes already taking place in libraries".

There is no doubt that librarianship is becoming more complex and more demanding than it was even a decade ago. Machine-readable data bases, and online access to these, have greatly increased the capability of libraries, even quite small libraries, to provide a high level of literature searching service. But these new capabilities demand more from the modern librarian. It is no longer enough for this librarian to be familiar with the information

sources physically present within the four walls of one institution. A single online terminal could now give access to several hundred data bases. The effective exploitation of these vast online resources depends on the librarian's knowledge of the scope of these data bases and on his or her ability to search them. This ability, in turn, requires some knowledge of indexing policies and practices, and of procedures for vocabulary control, as well as a familiarity with alternative searching strategies.

Moreover, technology does not stand still. In data processing and in telecommunications, new capabilities and applications emerge, one on the heels of another. Many of these developments, including satellite communication, interactive television, computer conferencing and electronic mail, offer exciting new opportunities for rapid and efficient information transfer, including transfer across international boundaries. The librarian of today cannot afford to ignore such developments. Indeed, far from ignoring them, the librarian should be constantly alert to their potential for increasing quality and efficiency in information services.

The library science curriculum of ten years ago is no longer adequate to prepare information professionals to adapt to the evolutionary forces that are converting us rapidly from a print on paper society to an electronic society. Yet, the curricula of library schools change slowly, and some schools have changed little in the past decade. It is time for a complete re-casting of these curricula. As Giuliano (16) pointed out some years ago, we must change the focus of our professional education. The focus should no longer be the library as an institution. Instead, we must take a much broader view: the whole field of human communication, formal and informal, and the role of the information professional in facilitating effective communication. The focus, then, shifts from the institution to the individual, to the information profes-

sional as a technical specialist removed from a particular institutional environment. This change in emphasis is needed now because online networks are fast bringing about a de-institutionalization process. Certain professional activities that were formerly performed within the library need no longer be performed within the library and further activities could become de-institutionalized in the near future.

The developments occurring in technology, and their application in innovative approaches to communication, make it imperative that librarians continue their education throughout their professional careers. Continuing education is becoming increasingly important in all branches of human activity. The universities, the national libraries, the professional societies, and international organizations have the responsibility to develop courses, workshops, seminars, and congresses to ensure that the librarian understands and applies appropriate techniques of today and tomorrow, instead of continuing to rely on the traditional methods of the past. Librarians, themselves, must accept some responsibility in this area--by convincing the appropriate organizations that such continuing education offerings are desired and needed and by identifying their own specific needs for further education and training.

It seems highly significant that the Commission of the European Communities is now supporting a study to identify certain characteristics of the information intermediary of the future, while the Department of Education in the United States is supporting one relating to the competencies required of the librarian of the future.

Conclusion

The rate of progress in the conversion to electronics will depend largely on what Cawkell (17) has referred to as the "convergence of telephone, data

transmission and computer technologies," which convergence, in turn, will be much affected by political, social, technological and commercial factors. Cawkell believes that the political and social factors, which greatly influence demand, will tend to retard the rate of change, while technological and commercial factors will tend to accelerate it. The next decade will reveal how quickly the technological and commercial factors are able to overcome the inertia that the political and social climate may impose.

Finally, Mme. Cartier quotes Neill (18) as saying that "only a catastrophe could cause a sudden and radical alteration in the way libraries develop". I would put this somewhat differently. A catastrophe will occur for the profession if we continue to cling to the methods and principles of the past.

Brown (19), a consultant on strategic planning and the management of change, has claimed that:

> Today's tidal wave of change is terrifying many people who have depended upon institutions that now are crumbling. (Page 20)

He goes on to say:

> As history shows us, during such transformations the institutions that comprise the framework of the dying society crumble and fall apart, a necessary pre-condition to the construction of the new institutions of a new society. Old institutions impede the development of a new age, which has new needs and new people. (Page 20)

It may well be that the library in a conventional sense--i.e., a physical facility housing physical artifacts- is beginning to outlive its usefulness and to become just such a crumbling institution. The library profession has the opportunity to construct the type of new institution that Brown refers to. Moreover, the new institution could be considerably stronger than the old one it replaces. But this will mean a change in our emphasis--away from the library

as a building housing artifacts and toward the technical expertise of the information specialist who may function independently of any particular physical facility. The professional information specialist has much to contribute to the age of information. Let us hope we are able to respond to the challenge.

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The Library network of the Soviet Union

by

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Meeting 269
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The library network of the Soviet Union

Our world is undergoing great changes both in the material and intellectual life of society. The unprecedented progress of science and technology exerts a growing influence on all spheres of our life and poses new problems before all existing social institutions.

As far back as the period of transition from the Middle Ages to Renaissance Rojer Bacon formulated his great thesis: "Knowledge is power".

The reality of the power of human knowledge to-day apparently prevails over the richest imagination. The so-called "informational explosion" which has been so much discussed lately is a natural phenomenon characteristic of the present stage of civilization's development. In spite of the heterogeneity of our world where the most perfect forms of accumulating and transmitting knowledge co-exist with illiteracy and retarded intellectual development the need for wide dissemination of knowledge accumulated by humanity is becoming more and more obvious. The progress of science and technology has given birth to numerous new forms and means of influencing the consciousness of people on a mass scale. The increasing use of radio, films, television and the latest electronic equipment for educational purposes sometimes gives rise to the question whether this does not diminish the role of the book both as a traditional means of accumulating knowledge and passing it on from generation to generation and as one of the most efficient forms of disseminating scientific and cultural values among the general public.

It is symptomatic that the present IFLA session is devoted to library networks. The fact that this theme is being brought forward shows that the importance of librarianship in the cultural life of most countries has not only not diminished but is constantly increasing and that libraries are developing and perfecting their performance according to the new needs and new possibilities which modern scientific and technological progress places at their disposal.

The significance of libraries in the cultural life of the peoples of the world is permanently increasing, their aims are becoming more complex and as of to-day they act not merely as book depositories but as informational, bibliographical and cultural centres.

Development of librarianship at present shows a pronounced trend towards a judicious integration of libraries, informational and cultural centres into a single national system. The evolving national systems based on the use of the latest intercommunication equipment will ensure that the activity of each library in the network will be highly rationalized.

Improvement of national network activities is achieved through international co-operation which is realized both by establishing contacts between individual libraries of different countries and by organizing well-considered interaction between national systems.

The importance of this trend is confirmed by the present Montreal Congress which has brought together representatives of more than a 100 library associations. These associations active in IFLA represent numerous countries, the library networks of

which are linked together, particularly through international loan and international book exchange. This can evidently be regarded as the first stage in the formation of a single international library system.

It should be noted, however, that from our point of view further development of co-operation between library systems of different countries is to a certain extent impeded by inadequate theoretical development of some organizational and methodological aspects of interlibrary co-operation.

Numerous papers on library science published all over the world show that all countries with a high library potential are building up large library complexes which provide increased availability of publications through library, bibliographical and informational services based on through investigations carried out in this field of knowledge.

It would, however, be an exaggeration to say that these problems have been solved completely since librarianship is characterized by unwarranted parallelism which results in unwarranted expenditure.

Meanwhile world scientific literature on librarianship is experiencing terminological difficulties due to unprecised scientific concepts and to terminological disparity in library studies of different countries.

At the same time we should like to note such positive issues of international library co-operation as the establishment of the Unesco international programmes: the NATIS programme and the Universal Availability of Publications (UAP) programme.

For many years the International Federation of Library Associations and Institutions has not only aspired to assist library associations in the field of sharing of professional experience but has taken many practical steps in this direction.

Bearing in mind this problem of experience sharing allow me to dwell on the library system operating now in the Soviet Union. As is known the basis of this system was established immediately after the Great October Socialist Revolution as one of its direct results, since prior to 1917 progressive-minded democratic circles could only dream about universal availability of books in Russia.

In 1918 the young Soviet State under the guidance of V.I.Lenin adopted a decree that united all libraries irrespective of their departmental affiliation into a single system of libraries serving the general public.

For nearly 65 years contemporaneously with the growth and development of our country its national library system has also been developing and improving, however we are still far from satisfied with some of the developmental trends of this system's activities. New conditions of life and new technological developments are constantly posing new problems before librarianship. These problems include the introduction of new techniques, automatization and mechanization which form part of the general demands of the Soviet State made to libraries and which are reflected in a number of resolutions and decrees of the Communist Party and Soviet government. Of particular significance to libraries is the decree of the Central Committee of C.P.S.U. dated 8 May 1974 "On increasing the part played by libraries in the communist education of workers and in scientific and technical progress".

This document stressed the importance of improving the standards of library administration throughout the country. It not only served as a basis for centralizing different types of libraries, improving the interlibrary lending system and achieving a greater efficiency in co-ordinating co-operation of diverse library networks, but is the main principle underlying the current work on establishing interdepartmental library networks.

Elimination of departmental disconnection, even territorial distribution of libraries in the country and close collaboration of libraries in rendering services to readers - such are the common aims and tasks of the State library system.

The fact that libraries are open to public use, that they are State property (90% are financed out of the State budjet and 10% - by trade unions and collective farms) and conform to a common organizational and methodological guidance serves to promote close co-operation and co-ordination of their activities and further the universal availability of publications to Soviet readers. There are 330,000 libraries in the country with holdings amounting approximately to 5 billion books. About 220 million citizens of the Soviet Union out of a total population of 266,6 million x) are library users.

The main part in this system is played by 130,000 public libraries evenly distributed throughout the country according to the existing administrative and territorial division. This network includes State (city, district, rural, children's) and trade union and collective farm libraries. In 1980 these public libraries with total holdings numbering 1,8 billion units of

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x) As of 1 January 1981. - Great Soviet Encyclopaedia Yearbook 1981.

storage served 140 million readers and gave out on loan 2,4 billion copies, thus evidencing an efficient circulation of books.

During the past decade one of the most serious problems facing Soviet librarianship has been the centralization of the country's library system.

The pooling of holdings, staff and financial resources of small city and district libraries made it possible to establish large library institutions with their own networks of branch libraries that have significant book holdings at their disposal. Soviet scientist V.V.Serov has described this measure in detail in his book entitled "The improvement of library systems in a developed socialist society".

Before centralizing public libraries a number of experiments was conducted, including the amalgamation of public libraries for adults and children into a single system and the amalgamation of these libraries according to two age groups. Experience has shown that depending on specific conditions both of these courses are acceptable.

The USSR Ministry of Culture passed a decision "on the expediency of establishing independent children's libraries systems only in large cities... In cities with an insufficiently developed network of children's libraries where the prospects of its development are null it is more rational to establish single centralized systems"[x].

Thus, on the basis of uniting central city and district libraries centralized library networks were established. Each of these

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x) В.В.Серов. Совершенствование системы библиотек в развитом социалистическом обществе. М.: Книга, 1981, с.108, 124.

networks formed a large library centre with significant staff and funds at its disposal. Their object is to conduct centralized acquisition and book handling and to build up and maintain unified reference systems.

School libraries which at present number 134,000 with book holdings that total 600 million bits of storage play a significant part in serving the rising generation.

Both general research and special libraries as well as university and college libraries constitute a large part of the Soviet library system.

A network of 23,000 scientific and technical libraries occupies a special place in the State library system. This network is directed by the State Public Scientific and Technical Library, subordinated to the USSR State Committee on Research and Technology.

Another large part of the country's system is constituted by the academic libraries network consisting of over 500 libraries of the USSR Academy of Sciences, the republican academies of sciences, specialized academies and research institutions and information institutes.

Among these of All-Union importance are the Library of the USSR Academy of Sciences, the Library of Natural Sciences of the USSR Academy of Sciences, the Institute of Scientific Information on Social Sciences and The State Public Scientific and Technical Library of the Siberian Department of the USSR Academy of Sciences. There are also central libraries of republican academies of sciences in each of the 15 republics of the Soviet Union.

Another component of the country-wide library system is constituted by 860 libraries of higher educational institutions which

provide for the education of future specialists. The scientific and methodological guidance of the libraries is exercised by the Scientific A.M.Gorky Library of the Moscow M.V.Lomonosov State University.

The enormous State system consists of yet another large and important subsystem of agricultural libraries. There are 1,500 of these with book holdings of 80 million copies. At the head of this network is one of the largest libraries of the country - the Central Scientific Agricultural Library of the All-Union Lenin Academy of Agricultural Sciences.

There is a similar subsystem of 4,500 medical libraries under the authority of the Central State Medical Library.

All the enumerated networks and subsystems constitute a large and complex system of networks united by the common goal of satisfying the needs of scientists, specialists, students and everyone interested in books as fully as possible.

In 1975 the USSR Ministry of Culture established the State Interdepartmental Committee invested with full powers for implementing a common State policy in librarianship and for co-ordinating the activities of all types of libraries in the framework of the country's library system. This Committee facilitates the solving of problems relating to the interaction of all networks constituting the system. The USSR Minister of culture acts as chairman of this Committee and the Deputy Ministers of departments concerned are its members.

Attached to the Committee is the Library Council which operates as a public consultative body. Its membership represents all the major libraries and networks of the country at a high administrative level (directors and heads of library-management

agencies).

At its regular meetings the Library Council considers such urgent library problems as the organization of the work of library networks, building up of book holdings, rendering service to readers, etc. The Library Council has numerous comissions both on methodological, bibliographical and research work and on maintaining and developing the international connections of Soviet libraries. Similar councils are active in all the 15 Soviet Republics.

The country also has a single system of methodological guidance of library activities. This system (based on a territorial and specialized principle) unites methodological centres of different levels (country-wide, regional and specialized) and works according to a unified co-ordinating plan.

The libraries themselves greatly contribute to a closer library interaction, and this is especially true of the State Lenin Library which is the national library of the Soviet Union. It is the initiator and organizer of specific forms of collaboration and works in close co-operation with other scientific libraries and in the first instance with central specialized scientific libraries that are united according to special fields of knowledge and are establishing strong interdisciplinary ties. The State Lenin Library plays an active part in investigating and improving library, bibliographical and informational services to readers and conducts research in the field of library mechanization and automatization and is thus conducive to raising the efficacity of library activities in the conditions of the present-day scientifical and technical revolution.

Great attention is payed to the development of library science. Over 300 scientific, general and specialized libraries and library school departments conduct research in this field.

The wide-ranging research and development of library science are necessitated by the need for defining the most practical rational and economical means of using State book holdings. The results of scientific analysis of the work of Soviet public libraries served the authorities and particularly the USSR Ministry of Culture as a basis for adopting certain practical resolutions: for example, the centralization of the state public libraries network, the function of research and scientific and technical libraries in the framework of the country's system for scientific and technical information, etc.

Seminars, conferences and symposiums organized by the major libraries also facilitate the development of library science.

Thus in May 1979 the USSR Ministry of Culture, the USSR State Committee for Science and Technology, the State Lenin Library and the State Public Scientific and Technical Library organized a notable conference on scientific and practical problems of the co-ordination and co-operation of Soviet libraries. The conference which was held in Moscow studied questions relating to library interaction, pooling of library resources and establishing a single system of library and bibliographical services.

Great consideration is given to the exchange of practical and theoretical experience both between domestic and foreign libraries. One of the most urgent problems of to-day is the problem of management which relates not only to the control of

library systems as a whole, but to the control of individual libraries.

The ALL-Union State Library of Foreign Literature organized an International Seminar in October 1979, which was attended by representatives of 10 libraries from 7 socialist countries. It's participants discussed the problems of modern library management and the use of the latest theoretical achievements in librarianship according to library structure and functions. The participants were greatly interested in the materials of the seminar and in the bibliography on library management prepared by VGBIL. These materials were published in VGBIL's proceedings and some of them were reproduced on the pages of the well-known international journal "Libri".

All measures on automatization of library processes are conducted according to the programme of establishing a State automated information system on science and technology in the USSR. All-Union, central specialized and interdisciplinary information agencies for science and technology and scientific libraries are participating in realizing this programme.

An universal concept of the structure and development of such a system has been evolved providing for close interaction of informational and library services aimed at the highest possible use of the rich holdings and information capacity of library and informational services and of scientific libraries in particular.

Work on the automatization of bibliographical and informational processes is being conducted in such leading libraries and library and bibliographical bodies as the State Lenin Library, the State Public Scientific and Technical Library, the Library

of Natural Sciences of the USSR Academy of Sciences, the Library of the USSR Academy of Sciences, the All-Union Book Chamber, the Institute of Scientific Information on Social Sciences as well as in a number of central specialized and republican scientific and technical libraries.

Lately automated systems in 78 All-Union, central specialized and regional informational bodies on science and technology and scientific libraries have been put into operation.

Concepts and programmes of automated systems for the acquisition and handling of literature, readers' services and others are being developed. It should be stressed that in spite of the admitted importance of automatization of informational and library processes the analysis of expenditure on automation proves its unprofitability in many instances and justifies the continued use of traditional forms of library work.

One of the integral parts of managing library systems is the availability of qualified librarians, without whom it would be impossible to render proper service to readers. Such staff is trained at 28 library institutions of higher learning and 130 secondary specialized schools. Among the largest of these are the Moscow and Leningrad State Institutes of Culture and similar institutes in other large cities.

Of special significance to librarianship is the problem of library planning on a national scale with the object of establishing a nation-wide library system capable of satisfying the library, bibliographical and informational needs of society and of defining the main developmental trends and prospects of librarianship.

For the first time such a plan formulating the concept of library centralization was prepared during 1966-1970 in the Russian Federation and has by now been realized.

The main trends of library development till 1990 have already been elaborated.

Such, briefly, is the description of the Soviet library system.

In conclusion I would like to express our gratitude to IFLA for including in this session's agenda the problem of national library networks in countries the library associations of which are IFLA members. Undoubtedly the professional experience and achievements of all library associations represented here will be of great value to them and conducive to conducting critical assessments of their own experience which will lead to further progress of librarianship in each country.

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PLENARY SESSION

NETWORKS: THE COEXISTENCE OF CONCEPT AND TECHNOLOGY

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NETWORKS; THE CONCEPT, AND TECHNOLOGY

The three basic natural
components for creative
activity are:
MATTER, ENERGY, INFORMATION

1. THE OVERVIEW

When we talk of Networks, the automatic picture which springs to mind is that of knots joined up by lines; and an old idea which has three essential parts: a communicator, a receiver, and a channel or link between the two. With these three elements, we could say that communication is a simple business. The world of today, however, has proved that it is anything but simple, since these same three elements have produced phenomena which are both complex and alien to each other.

Modern civilization knows that communication and information have become, noticeably, dramatically and strategically important. Political implications are obvious, as are those affecting economic, cultural and social affairs. Individual people, communities and countries have to fight for survival using them. Spectacular advances have been made in the simple business of transferring information: but technology in particular has influenced the field of communications as a revolutionary among the revolutionaries.

1.1 NO MORE FRONTIERS

To grasp even partially such advances, let us take three examples that concern us. Documentation, information and telecommunication. Not long ago, the three were separate. Today, electronic aids and new techniques have blurred the frontiers between them, or even removed them. As an example, the unwary telephone subscriber (communications) can call up a computer (information) stocked with bibliographic data (documentation).

That description used to be a dream, but today is a reality and is ordinary, in any town, or between a place in one country and any place in another, across an ocean. To achieve it, we have needed telecommunications, satellite, and cable links: signal conversion: digital storage and recovery; classification and interpretation of data to the highest degree of precision; where indeed can we draw the line between our three areas of communication ?

1.2 INFORMATION SYSTEMS

The final report of an Intergovernmental Conference (1) gives some idea of how information systems can be opened up for modern societies; stating that if a maximum effort is not made to master them, those societies will continue to live in a state of submission. Information is not just power, it is a system for exploiting that power.

The human mind, working with this technological profile, will determine whether or not the use of information will be directed towards progress, creatively, as a splendid lever to move worlds with. If it is not used in such a way, then it may well be a knife in the back of the liberation of man, and may well be even a way to set man against man.

Computers have solved a great many problems in the field of communications. But their impact on the individual and on his society have not been much studied or thought through.

It is not easy for developing countries such as Colombia, to understand Servan-Schreiber's dramatic "World Challenge" (2). He says that the key to future development and to technological revolution must be beneficial, because it relies on two raw materials: Silicon (for computer circuits) and grey matter (human brains to design and manage them).

It is not easy either to understand the challenge of the fifth generation of computers: how can one million transistor circuits be printed onto an area of one square millimetre ? More disturbing still is a report in Popular Science (3) which talks of the " edcuation" of microorganisms to work in biological computers, as programmed transmitters of information.

1.3 DOCUMENTATION

In documentation,and in scientific and technical information, change has been equally swift, and quieter, and less spectacular. It has given rise to some reasonable hopes: techniques for management of bibliographic data have changed in recent years rather faster than in the last few centuries. As this is a central theme of this Congress, and we must look at it in more detail later, let us now look at other aspects of our problem.

1.4 TELECOMMUNICATIONS.

Telecommunications are today's omen for tomorrow. They are the most aggressive solution yet devised to join communicators with receivers. And the problem looked so simple. We now have a few not-so-simple words to use: satellites, telephones, television, fibre-optics, micro-waves, and on top of that, the non-conventional media.

With this, any country has a chance to join in. Unfortunately, application has been poorly controlled, technological media have been taken over by private interests, as have indeed the contents of what is communicated. This has sometimes caused political and social effects which are far fron desirable. Its use has been criticised or rejected, especially where free circulation of information has been suppressed or limited.

It is in precisely this field that the international community can identify the greatest inequalities. Indeed, "Freedom of

Information", a principle so often discussed in international forums as being among the most basic of human rights, has turned out to be a convenient phrase to cover up the fact that the information is free to flow in one direction only. By contrast, many countries, especially in the developing world,have agreed that a genuinely free, balanced, and two-way flow of information has to be guaranteed.

The debate at international level on this subject has discovered diametrically opposed positions. For example, we have heard over and over again, the accusations that certain powerful and technologically advanced countries exploit their position of strength to impose cultural and ideological domination, by which means they deform the national identities of other countries. On the other hand there are clear warnings for all that the breakup of such " communications colonialism" could be used as a dangerous pretext for placing the exclusive control of information in the hands of a few powerful bodies, thus allowing them to impose their own picture of the reality of society.

2. THE BASIC PROBLEMS AND NEW PROBLEMS.

To explain why there is universal agreement that co-operation is necessary and that national and international information networks are required, we must look at the problems they would try to solve.

2.1 INFORMATION - A PARADOX

We must recognise that the evolution of thought has always been very closely linked to the manner and means available for storing, classifying and ordering knowledge. There is no doubt that today's progress relies to some extent on knowledge and development of other times and from other places. Concretely, this principle means that we have libraries, archives and other forms of record.

In a very simple way, we can state that since the foundation of the library at Alexandria, the concept applied for the handling of information underwent no substantial change until the beginning of this century. We also know that in many countries we can even today find libraries and archives being managed in the same way as that first great library, hundreds of years ago.

In such a situation, it is easy to understand that imbalances in the area of communications are the norm. Studies on this phenomenon made towards the end of the sixties showed how the very high rate of generation of documents and other elements of information had started up an exponential curve of accumulated growth of the mass of information available since the beginnings of society -- a problem well-known to all of you (5).

It became evident as well, that the role of the libraries, services and existing information services, required deep modifications in order to make easier the access to updated and relevant portions of that huge informative mass. It became stronger the criterion that only by rationalizing the individual and collective tasks in the libraries, could such situation be faced and help the user to sail in the ocean of documents. The nature of the problem could then be defined, as a paradox: super-abundant information in the generating sources, and poor relevant information for the user.

2.2 A TRANSFORMING FACT

A phenomenum characterized in the seventy's was summed up to the problem: The automatization. The technological revolution was soon felt in conventional procedures , in the treatment of information in libraries and alike services.

In spite of the fact that the capacity and speed of the machines seemed to solve the problem, the elements involved in the process of information transfer, were surprisingly misplaced. It is important now, to change the schemes, to make possible mediation of new computer technologies, storage, tele-communications, reproduction, micro-reading, etc.

As an example of these transformations, we could mention the photocopier (or xeroscopier), which in a subtle way broke out a silent revolution, and multiplied by many times, the existing documental mass. This technology was generally accepted, but its effects on the processing of documentation, have not so far been examined.

(An old librarian told me that due to the high number of copies, he now was confused whether he himself was an original or a photocopy)
As a professional in engineering, specialized in computers, I must stop here and make this reflection: The director of a library cannot expect all his problems to be solved by a computer or any other technology. In fact, a device as a computer, basically introduces an "amplifying factor", in storage, process versatility or handling speed.
The introduction of this technology into a well designed technical process, produces fantastic results, but is the process has been badly designed, we will obtain a monstrous magnification of mistakes.

Let us observe, how the most important bibliographic data banks, -so important now- are in fact the result of many years devoted to improve the technical process to obtain

and register information, important investments, and the adequate incorporation of a modern technology.

It is just the choice problem in the field of technologies, the one that has serious characteristics. Let us observe for example, how the revolution of the information and communications, transform the structure of many industrialized nations, but developing countries can only be benefitted slowly and feebly of the technical innovations that have not been even conceived due to their developing requirements, they do not take into account the planning and working capacity, and are often introduced without considering the evaluation and transfer problems. It is perhaps in this field, where there is a dangerous difference between the developing countries and the industrialized countries; this fact can have irreversible consequences, if corrective measures are not taken rapidly.

In brief, you may ask: Does the librarian feel he is part of that problem? In what way? Has he taken an individual or a collective position to this respect? This is a new problem.

2.3 THE NEW STRATEGIC VALUE OF INFORMATION

Without having been solved the problem known as the exposed explosion of information, and surprised by the tele-informative revolution, the librarians could verify that the importance of information was not relied to the scientifical and technical sector. Its presence in governmental procedures, developing planning and commercial and industrial production, expanded the reach of the "paradox" to new economical and social spheres.

Let us mention as an example, that the worldwide concerns in establishing a "New International Economic Order" have required a redefinition of the needs of the information conditions.
(6)

The international community promoted instruments such as the North-South dialogue - now stopped - South-South dialogues, or technical cooperation between Developing Countries (CTPD), the regulations for trans-national actions and for technology transfer, and at the same time, promoted the review of a new worldwide technology, communications and information order. It is in these fields where the major differences are perceived, and the reorganization needs to be political, legal and economic, to create an effective new right for "an informed society".

Information is to be accorded a high place in strategy in the relations between countries, for example, to increase technological negotiating capacity between one set of countries and another.

As an illustration of this, we need do no more than mention the dependence that exists of a country which does not have scientific and technological knowledge, on one which has these things. Naturally, there is a clear state of direction and conditions governing information and power.

3 COOPERATIVE PROGRAMMES AND AUTOMATIC LINKS

Many countries, working together with a number of international organizations, have designed and built networks and systems for information, in which successibly wider participation and exchange has been sought, both geographically and in terms of specialization.

It was therefore obvious that libriaries, archives, data banks, and information services, had to be integrated on a worlwide basis, and all these sources of information have had to learn to accept and to practice the " Law of Shared Resources".

Management of Information problems has always implied that the systems used cannot be confined within national borders, and that there is a need for contious renewal of machinery and mentality to provide form and substance to solutions in a field which is very highly diversified, and in a state of rapid progress. In sum, cooperation between countries, organizations, and individuals turned out to be more necessary than ever in providing proper solutions for informations problems.

This need was translated into the creation of a series of treaties, pacts, agreements and networks of all kinds, whose purpose was to put together the efforts, resources, and problems common to different processors of information, libraries, archives, data banks and specialized services.

3.1. INTERNATIONAL NETWORKS

Theoretically, a traditional network can be looked at as a collection of units of information, with connections between them.* In the instance which interests us, the connections can be neither the various types of exchange of information between the units, nor the set of programmes of action as a whole.

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* See bottom of page 8

In practice, this simple idea has taken on a great many complex forms, given that very often a number of units (libraries) is either unknown, or unstable, the units are not of the same type, the relationships between them have not been properly established, and the flow of information is not regular. For this reason, in Latin America, for example, networks have been used for information exchange. We now also have for the same purpose, networks as physical connections with eletronic elements.

For this reason, in the context of the United Nations, one of the first intergovernmental networks to be set up was UNISIST. This was an answer to the idea of creating a world centre for scientific information, but it was conceived as "a flexible network, based on the voluntary cooperation between existing and future services" (5)

The system is based on the establishment of national centres for the development of a joint programme promoting international cooperation and assistance to developing countries.

The principal lines of action were directed towards developing local and regional activity, towards formulation of policy and plan in information, towards the making up an application of common standards for processing and exchanging information. With this end, there have been a number of meetings, courses, seminars and conferences. A large number of reports, guides, manuals, and bulletins have been produced. In this way, UNISIST made the international community aware of necessities in the field of information.

With the same basic philosophy, other systems and networks have been designed and set up on an international basis, with the support of inter-governmental organizations such as those of the United Nations, professional bodies, and technical organizations.

In Latin America, at regional level, work done by the OAS through its regional programme for Scientific and Technologic Development, has been of the first importance, as has that done through the regional programme for Library Development. In both cases, the OAS project have promoted in several countries the formation of an infrastructure which did not exist, the education of people to manage it, the use of bibliographic media, and the creation of some public awareness of the problems surrounding information. These stages, although they have taken a long time to complete were absolutely necessary to provide a solid base for future information networks at a continental level.

With the help of the OAS important needs for technical information services were met for the productive sector, national information networks were designed, and specialized services were integrated on an interamerican basis.

Other recent efforts, also directed at obtaining cooperation between countries in the transfer of information, are:

a) SAIT (The Andean Technological Information System) whose purpose is to integrate andean group countries in an information exchange programme on technological transfer capacity. In particular, there is exchange of information on technological contracts, licences, patents, copyright, commercially available technology, and in general on technological documentation available in the area.

b) RITLA, (The Latin American Technological Information Network), whose organization has been managed by SELA in recognition of the political importance of information, and giving special support to the Latin American countries in the transfer of technology. The Project is now under study by the various governments, which will determine the networks' final form.

We could list many other initiatives of this type in this continent, but at the moment it is worth mentioning only that all of them use the same basic idea as a structure for international information networks. The same thinking has produced a proposal for the creation of a "World Information Network" in the action plan which came from the United Nations Conference on Science and Technology, which took place in Vienna in 1979. (7)

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* Formally, network Z consists of:

a) a group of information units U such that U= U_1, U_2, U_3, ...U ,...U_n and
b) of a group of relations between them, R, such that $R=\{r_{ij}\}$ where i, j=1,2,3...,n. That is to say $Z=\{U,R\}$

3.3 NATIONAL NETWORKS

When we look at the way in which individual countries treat those information systems which allow them to form part of international networks both generally and in specialist areas, we find that many have applied the same principles for organizing national information networks. Sometimes, these networks have become complex coordinated systems, of which several different kinds of unit form part, linked together in sub-networks, or defined by their purpose, by their specialization or by their geographical position.

There are many questions to be ansered on national networks, with respect to their management, their aims, their organization, structure, function, coverage, service, and development; none of these questions has an immediate answer.

One of the first excercises to be undertaken is the clarification of policy in science, technology and culture. This must be analyzed in terms of worldwide requirements and a given countries development. Obviously, we must recognise that the formation of policy requires input from and consultation with several parts of the community, and the policy will not necessarily be completely clear, since it is a field subject to many kinds of variation, which in turn depend on external factors at internal development policies for modification in each country.

The national information network will therefore have a framework of ideas within which will be fixed clearly and realistically its aims, functions and plan of action. Further, examination in depth of the logic of existing infrastructure will allow alternative designes for the networks structure and organization. In other words, whether the network will be centralized, coordinated, descentralized; the type and distribution of sub-networks technical and administrative organization, and the type of participation to be given to public and private units of information.

Whatever plan is adopted, there will be few decisions more important than that of forming human resources necessary to work with the information. Finally, if it is thought that the problems surrounding information ar real, and as such, must be solved, it will be necessary to draw on all possible resources to ensure clear public awareness of what they are and to mobilize politics, finance and institutions to provide assistance to this end.

3.4. WHAT IS THE NETWORK? MEN OR MICROCHIPS?

The typical information service can be computerized in many

areas, from the internal operation of a library to the automatic transfer of data to the final user.

Today, we are already familiar with mechanical routines for managing the day to day operations, such as circulation acquisition, inventory, accounting and even technical processing of materials. For some years now, there has been computarization in services provided by a library or information centre , particularly in searches, summaries, classification and information recovery. An example of this are the bibliographic data basis, which are information files of different kinds, with multiple access and recovery electronically stored on a computer. Recently, the computer has been applied to the exchange of information between different units, carried out by communication of one computer with another, whether on special cable networks, or on ordinary telephone lines used for data trasmission, including transmission via satellite.

For the application of computers to most networks already designed, there is a requirement, apart from technical facilities, for a certain amount of programming, special standards and formats for the exchange of information and what are called "Protocoles" for sending and receiving messages. Although some technologies require specialized personnel to operate such systems, the tendency today is to make their use possible by untrained people.

We all know of the bibliographic data basis probably derived from the records of very well run libraries, and made up with many years of patient labour.There are so many bibliographic data basis available, that is has been necessary to take on an intermediate level of administration which in some cases has been in the form of commercial corporations. Through them it is now possible to consult data bases from almost any part of the world, and on any subject. Also, there is now discussion on the possibility of an individual user obtaining from these data bases, not only bibliographic reference, but also copies of the documents themselves, digitally transmitted by systems such as Telefax or video-text.

Nonetheless, we must remember that the convenience provided by the systems cannot be taken as a substitute for the work which has to be done within any country to obtain a record of the locally produced literature . This would appear to be a political debate of great importance, to avoid a growing dependence on international information suppliers.

Alongside this idea, there is a much clearer need now to standardize software which manages bibliographic information. At present, there is a state of war between languages used which could indeed produce a sort of computerized Babel.

In contrast to these 21st centry concerns, in most developing countries in the world, only very few sectors of society have access to the new information systems and there is very little awareness of their importance. There is no such thing as the "dativorous animal" The possibilities for access and use in data systems are still very slight for the greater part of the community.

In our countries, we experience situations such as: on-line consulting of data banks abroad, to obtain hundreds of references on a subject in a few minutes, only to have to wait several days for someone to go from door to door in the local libraries trying to find the materials, or having to ask for such well-known foreign services as that of the British Library.

Many administrators are concerned about the "technology gap" which exists between instant search, and the delivery of documents. They believe that for many years, the machinery for transferring information will contine to work in their countries along traditional lines, and will basically depend on the postal service.

Naturally, we know that there are ways of using modern technology, and reducing its costs, and adapting it to local conditions. For example, one strategy which appears to be worthwhile is that of concentrating all consultations to overseas data bases into one microcomputer, which would store them and transmit them on-line in batches during the night, so saving time and expense. The answers can be received by mail or indeed, sent back automatically to the microcomputer.

At this point, we must stop and remember that no matter what type of technology we use or on what scale, the development of networks, whether physically connected together, or conceived as collected programmes carried out by different institutions, has always taken as its starting point, "the Associate Networks". It is professional associates who in the end become the contact points in the network: they are the directors of libraries and information services.

Acting as sources of information, as collectors of data for input to the network or as providers of a service, the associations of Librarians have set up "Live networks" grounded on an unlimited will to provide service and an amazing capacity to work together. In this way, over many years, language barriers, national frontiers, technological imbalances, and extreme differences in infrastructure capacity, have been overcome.

It is an acknowledged fact. And we believe that the survival of the association networks will allow for the peaceful co-existence of the most modern technologies with the traditional methods, in the management of information problems in the years to come. Even if there are different ideas as to what a network is, we can agree that nothing can be done if we do not exploit the tremendous efforts made by those who work in the field of information, who, without resources, within great limitations, and without any particular political or financial support, have turned the aim of a service to the user into an aim commanding the respect of the international community. This meeting may well be considered to be an act of renewal of our faith in the worldwide network of our colleagues here assembled.

4. ARE WE DREAMING?

Let us remember that all our efforts have been directed towards one final objective: to provide an information service direct to the user. The difference between these efforts consist in the fact that some can provide the service more easily than others, as is the case of the newspapers, radio and television, which use mass media to transmit their messages directly to anyone who can receive them. It is not so easy for systems based on the written word, although some of the new technologies have introduced substantial changes in this area, specially the VIDEOTEX system (8)

The Videotex system seems to penetrate the mass market, in which access to data is obtained by using existing channels for television broadcasting, or the telephone system, to provide communications links between data banks or computers sited in appropriate places, and ordinary television receivers as the terminal. This means that anybody can receive in his own home messages from data banks transmitted by television signal, and in some cases, can consult the computer on ordinary telephone lines. By coincidence, Canada set up one of these systems, called Telidon, which can be considered to be the system of tomorrow, operating today.

We cannot avoid the temptation to mention at this point, the video-disc, as an example of the technology which librarians should be familiar with: it is to be hoped that the high storage capacity of the disc, and its low cost, will allow it to replace systems now known such as micro-fiche and magnetic tape in the near future. The video-disc can store complete data bases, and could be offered on sale to the public as a commercial venture.

In this way, anyone could consult a video-disc in the comfort office home with the simple attachment required for using such discs with domestic TV. Can you imagine what will happen to those expensive searches made on-line to data bases? The dream of on-line networks would seem to fade away more quickly than we had expected.

4.1 ALL CLEAR?

We have not just been describing science-fiction technology We have been describing systems which have already been developed and are only waiting for an answer from the market to be converted into a commercial reality. For librarians, the consequences will not be simple.

One of the first effects will be a change of role for those who today handle information. It is probable that the end-users will need less and less from them in their searches for information. Their new task will be that of becoming advisers on programming methods, selection of data bases, the use of micro-processors, administration of texts, video-disc systems and, for that matter, telecommunications. At present, nobody coordinates this function, and for that reason, there is a splendid opportunity to make a move in this direction. Ironically, we are led to believe that professionals in the information business, are themselves well-informed people, and can see ahead to such changes.

Nonetheless,in many of our developing countries, there will for some years be a strongly conservative attitude towards such changes, which will cause very real dangers to professions such as that of the librarians who will have to live with new technology based on traditional training.

In the developing countries, it will also be difficult to assign priorities. It will not be possible to avoid the introduction of new developments, but at the same time, it will be necessary to maintain such conventional systems as that of a public library. To work simultaneously on such different fronts, implies high cost, given that training programmes must be at once traditional and modern. So also, must equipment, infrastructure, and worst of all the technicques for processing information. All these things affect the internal organization of a country's resources as applied to information. The consequence of the situation are serious, in that it would be necessary to make basic investments peace-meal, and in all probability none of the problems involved will be properly dealt with, even after a maximum effort has been made: and that is a typical description of a developing country.

As a result, I am clear on only one point: ignorance is not to be forgiven. A colleague remarked that for many years, librarians in our countries have gone about their business as if new technologies had not been developed: they have been ignorant of the process challenging them, although with their own hands, they manage the information describing the same new developments. For this reason, we cannot be forgiven for not being prepared to follow the road of development, even if there are structural limitations on our success in following it. A simple instance of this point of view is often to be found if we examine the curricula with which we educate librarians today who will have to face the problems of the coming decade.

4.2 THE BASIC HYPOTHESIS

Finally, what are networks for? They are for sharing ! The basic hypothesis is that the information services for the end-user improve both in quality and in availability, if we all contribute to the creation of a collective capacity which is greater that the sum of its individual parts.

This definition when applied to a network, means to me some sort of "alliance". If you wish, and "electronic alliance" between librarians and users, but at all events it is a key word representing the corner-stone of every creative entreprise of man.

In these terms, IFLA is an "alliance of alliances". IFLA has elements which could make it one of the most powerful professional associations on earth. And this is simply because it is connected to one of the most important sectors of development for the future, namely information: and because it is made up of professionals and alliances among professionals coming from all corners of the world. You, distinguished memebers of this Congress, shall decide if what I have said here is no more than a dream. But after this brief journey we have made together into the idea of a network, I am not going to try to force conclusions, that would hardly be fair on me, and indeed it is the work which each one of you must do to justify your presence here.

But I would just like, on closing to quote you a sentence which to me is a prophecy.

> THE UNDERDEVELOPED NATIONS OF THE WORLD OF TODAY ARE THOSE WHICH CAME LATE TO THEIR INDUSTRIAL REVOLUTION: THE UNDERDEVELOPED NATIONS OF THE FUTURE WILL BE THOSE WHICH COME LATE TO THE INFORMATION REVOLUTION

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